User Manual

EDANUSA

VE-1010

Veterinary PC ECG

Release 1.2

CE

About this Manual

P/N: 01.54.109855-12

Release Date: May 2011

Statement

This manual will help you understand the operation and maintenance of the product better. It is reminded that the product shall be used strictly complying with this manual. User's operation failing to comply with this manual may result in malfunction or accident for which EDAN INSTRUMENTS, INC. (hereinafter called EDAN) can not be held liable.

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EDAN holds the rights to modify, update, and ultimately explain this manual.

Responsibility of the Manufacturer

EDAN only considers itself responsible for any effect on safety, reliability and performance of the equipment if:

Assembly operations, extensions, re-adjustments, modifications or repairs are carried out by persons authorized by EDAN, and

The electrical installation of the relevant room complies with national standards, and

The instrument is used in accordance with the instructions for use.

Upon request, EDAN may provide, with compensation, necessary circuit diagrams, and other information to help qualified technician to maintain and repair some parts, which EDAN may define as user serviceable.

Terms Used in this Manual

This guide is designed to give key concepts on safety precautions.

WARNING

A **WARNING** label advises against certain actions or situations that could result in personal injury or death.

CAUTION

A **CAUTION** label advises against actions or situations that could damage equipment, produce inaccurate data, or invalidate a procedure.

NOTE

A **NOTE** provides useful information regarding a function or a procedure.

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Chapter 1 Safety Guidance

This chapter provides important safety information related to the use of VE-1010 Veterinary (hereinafter called VET) PC ECG.

1.1 Intended Use

VE-1010 VET PC ECG is a PC-based diagnostic tool intended to acquire, process and store ECG signals from pets undergoing resting test. VE-1010 VET PC ECG is intended to be used only in pet hospitals by trained veterinary surgeons or technicians or drug researchers. The cardiogram recorded by VE-1010 VET PC ECG can help users to analyze and diagnose heart disease. However the ECG with measurements and interpretive statements is offered to users on an advisory basis only.

1.2 Warnings and Cautions

To use the system safely and effectively, firstly be familiar with the operation method of Windows and read the user manual in detail to be familiar with the proper operation method for the purpose of avoiding the possibility of system failure. The following warnings and cautions must be paid more attention to during the operation of the system.

Note:

1. This system is not intended for home use.
2. The pictures and interfaces in this manual are for reference only.

WARNING

1. The system is intended to be used by trained veterinary surgeons or technicians or drug researchers. They should be familiar with the contents of this user manual before operation.
2. Only qualified service engineers can install this equipment, and only service engineers authorized by the manufacturer can open the shell.
3. The results given by the system should be examined based on the overall clinical condition of pets, and it can not substitute for regular checking.
4. This system is not intended for treatment.
5. This system is not designed for direct cardiac application.
6. Connecting to other devices may decrease the antistatic gradation of this device during operation.

WARNING

7. Connecting to other devices may decrease the antistatic gradation of this device during operation.
8. **EXPLOSION HAZARD** - Do not use the system in the presence of flammable anesthetic mixtures with oxygen or other flammable agents.
9. **SHOCK HAZARD** - The power receptacle must be a hospital grade grounded outlet. Never try to adapt the three-prong plug to fit a two-slot outlet.
10. Do not use this system in the presence of high static electricity or high voltage equipment which may generate sparks.
11. In order to avoid being burnt, please keep the electrodes far away from the radio knife while using electrosurgical equipment.
12. Only the patient cable supplied by the manufacturer can be used. Or else, the performance and electric shock protection can not be guaranteed.
13. Turn off the system power and remove the power cable before servicing or maintaining the system.
14. Please do not operate the system during servicing or before it is running normally.
15. Make sure that all electrodes are connected to the pet correctly before operation.
16. Ensure that the conductive parts of electrodes and associated connectors, including neutral electrodes, do not come in contact with earth or any other conducting objects.
17. Electrodes with defibrillator protection should be used while defibrillating.
18. The disposable electrodes can only be used for one time.
19. Electrodes of dissimilar metals should not be used; otherwise it may cause a high polarization voltage.
20. Do not touch the pet, bed, table or the system simultaneously while using the system together with a defibrillator.
21. If reusable electrodes with electrode gel are used during defibrillation, the ECG recovery will take more than 10 seconds. The manufacturer recommends the use of disposable electrodes at all times.
22. Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of the standard IEC/EN 60601-1-1. Therefore anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the

WARNING

requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.

23. The summation of leakage current should never exceed leakage current limits while several other units are used at the same time.
24. The equipment is protected against malfunctions caused by electro-surgery according to the clause 36.202.101 in the standard IEC60601-2-25.
25. To the pet with a pacemaker, the results given by the system may be invalid.

CAUTION

1. Federal (US) law restricts this device to sale by or on the order of a physician.
2. Visually examine the package prior to unpacking. If any signs of mishandling or damage are detected, contact the carrier to claim for damage.
3. Avoid liquid splash and excessive temperature. The temperature must be kept between 5 ºC and 40 ºC during operation.
4. Do not use the system in a dusty environment with bad ventilation or in the presence of corrosive.
5. Make sure that there is no intense electromagnetic interference source around the system, such as radio transmitters, mobile phones etc. Attention: large medical electrical equipment such as electrosurgical equipment, radiological equipment and magnetic resonance imaging equipment is likely to bring electromagnetic interference.
6. Before use, the system, the patient cable, electrodes etc, should be checked. Replacement should be taken if there is any evident defectiveness or aging symptom which may impair the safety or the performance.
7. The following safety checks should be performed at least every 24 months by a qualified person who has adequate training, knowledge, and practical experience to perform these tests.

   a) Inspect the equipment and accessories for mechanical and functional damage.

   b) Inspect the safety related labels for legibility.

   c) Inspect the fuse to verify compliance with the rated current and circuit-breaking characteristics.

   d) Verify that the device functions properly as described in the instructions for use.

CAUTION

e) Test the protection earth resistance according to IEC/EN 60601-1: Limit: 0.1 ohm.

f) Test the enclosure leakage current according to IEC/EN 60601-1: Limit: NC 100 μA, SFC 500 μA.

g) Test the patient leakage current according to IEC/EN 60601-1: Limit: NC a.c. 10 μA, d.c. 10 μA; SFC a.c. 50 μA, d.c. 50 μA.

h) Test the patient auxiliary current according to IEC/EN 60601-1: Limit: NC a.c. 10 μA, d.c. 10 μA; SFC a.c. 50 μA, d.c. 50 μA.

i) Test the patient leakage current under single fault condition with mains voltage on the applied part according to IEC/EN 60601-1: Limit: 50 μA (CF).

The data should be recorded in an equipment log. If the equipment is not functioning properly or fails any of the above tests, the equipment has to be repaired.

8. The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal.
9. Precautionary maintenance of this system, including periodically cleaning and checking the appearance, can be finished by users because this maintenance does not touch the interior.
10. Before cleaning or maintaining the system, turn off the system power and remove the power cable.
11. Prevent the detergent from seeping into the equipment while cleaning.
12. Avoid pouring liquid on the equipment while cleaning, and do not immerse any parts of the equipment into any liquid.
13. Do not clean the unit and accessories with abrasive fabric and avoid scratching the electrodes. Removing all dust from the exterior surface of the equipment with a soft brush or cloth, or with a soft cloth which is slightly dampened with a mild detergent solution or cool disinfector. Especially the tie-in and the panel edge should be noticed.
14. Any remainder of detergent should be removed from the unit and the patient cable after cleaning.
15. Do not use chloric disinfectant such as chloride, sodium hypochlorite etc.

1.3 List of Symbols

	Equipment or part of CF type with defibrillator proof
	Caution
	Consult Instructions for Use
	Recycle
P/N	Part Number
SN	Serial Number
	Date of Manufacture
	Manufacturer
EC REP	Authorized Representative in the European Community
CE	The symbol indicates that the device complies with the European Council Directive 93/42/EEC concerning medical devices.
	It indicates that the device should be sent to the special agencies according to local regulations for separate collection after its useful life.

Chapter 2 Introduction

VE-1010 VET PC ECG has similar functions with an ordinary electrocardiograph. ECG data can be sampled, analyzed and stored in a PC, and it can be saved in PDF, Word, BMP or JPG format. ECG waves can be frozen and reviewed. Auto measurement is available, and the diagnosis template can be edited.

With high performance, reliability and easy operation which are suitable for ECG diagnosis of medical institutes of all kinds and useful for the heart disease analysis, the VE-1010 VET PC ECG can help to reduce doctors' workload greatly.

VE-1010 VET PC ECG system includes the following equipment:

- VET PC ECG software
- Sampling Box
- Patient Cable
- Electrodes
- USB Cable

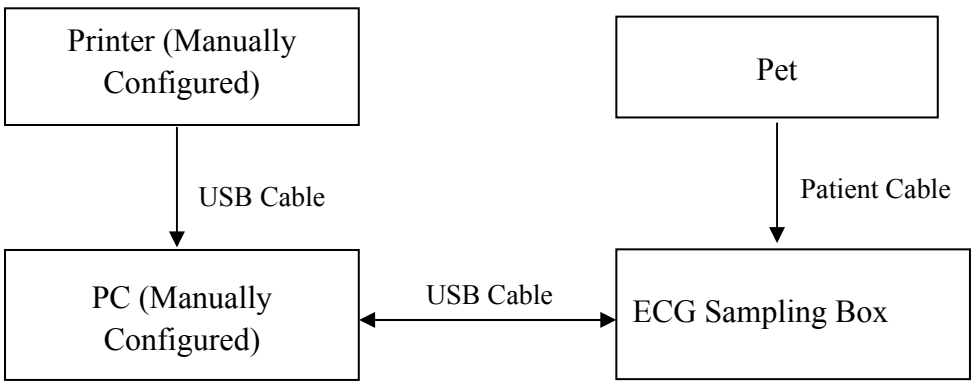
Note: If the PC is not purchased from our company, we will not be held responsible for the maintenance of the PC hardware or the operating system.

The product is suitable for normal ECG recording and analysis of pets.

WARNING

1. This system is intended for use on pets only.
2. Ensure that there is no other database software in the PC in which our software will be installed.
3. This system is not designed for direct cardiac application.

The installation of VE-1010 VET PC ECG system:

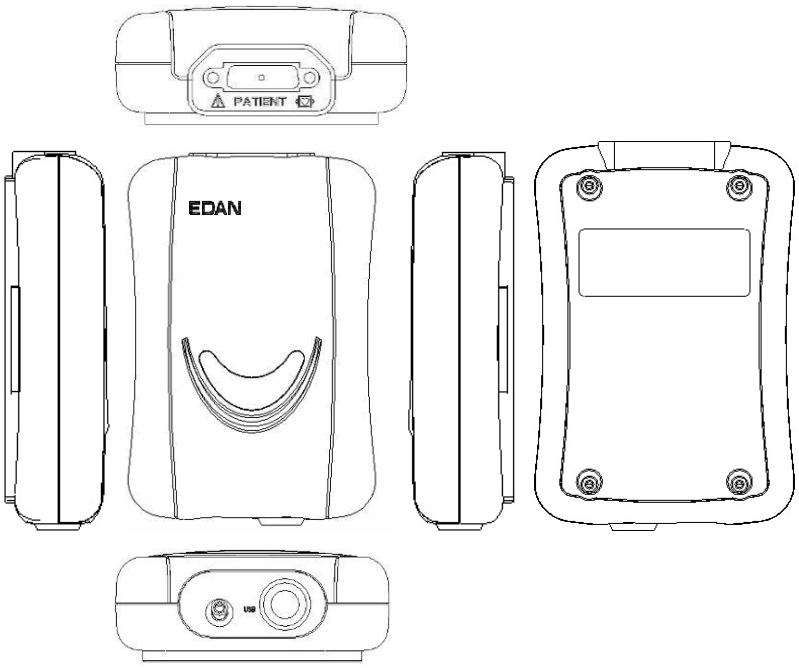


WARNING

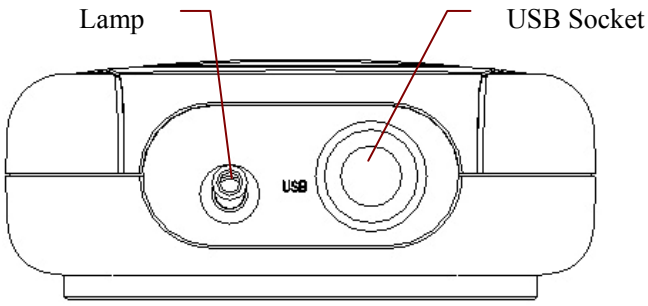
The system should be installed by a qualified service engineer. Do not power on the system until all cables are properly connected and verified.

2.1 ECG Sampling Box Appearance

ECG Sampling Box Appearance



Front Panel

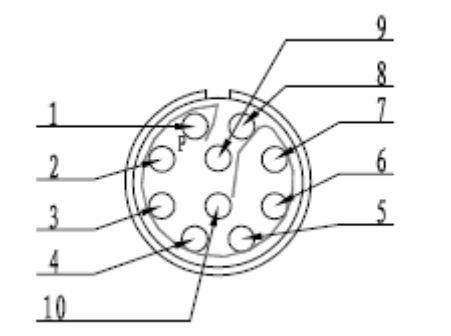


Name	Explanation
Lamp	When the ECG sampling box is powered by the PC, the lamp will be lit.
USB Socket	Connecting to the USB socket of the PC with a USB cable

WARNING

1. When the computer connected to the USB cable is powered on, do not connect or disconnect the USB cable to the ECG sampling box.
2. It is not necessary or recommended to regularly disconnect the USB cable from the ECG sampling box. Disconnect the USB cable from the PC if necessary.

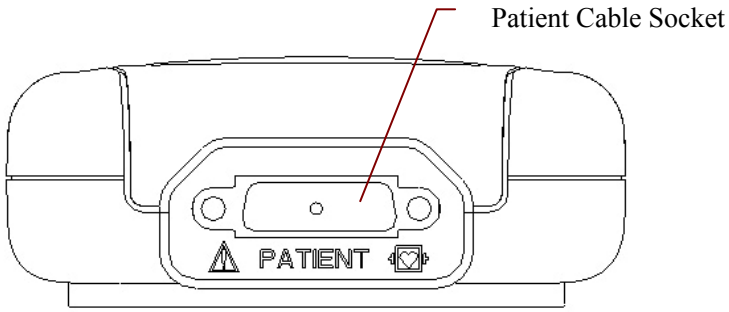
USB Socket



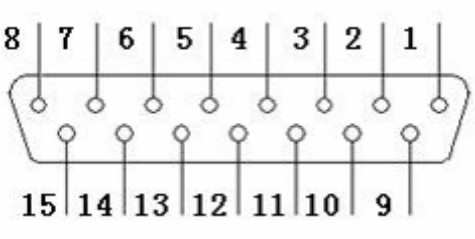
Definitions of corresponding pins:

Pin	Signal	Pin	Signal
1	GND	**6**	GND
2	VCC	**7**	GND
3	QRS	**8**	GND
4	GND	**9**	D-
5	GND	**10**	D+

Back Panel



Patient Cable Socket



: Applied part of type CF with defibrillator proof

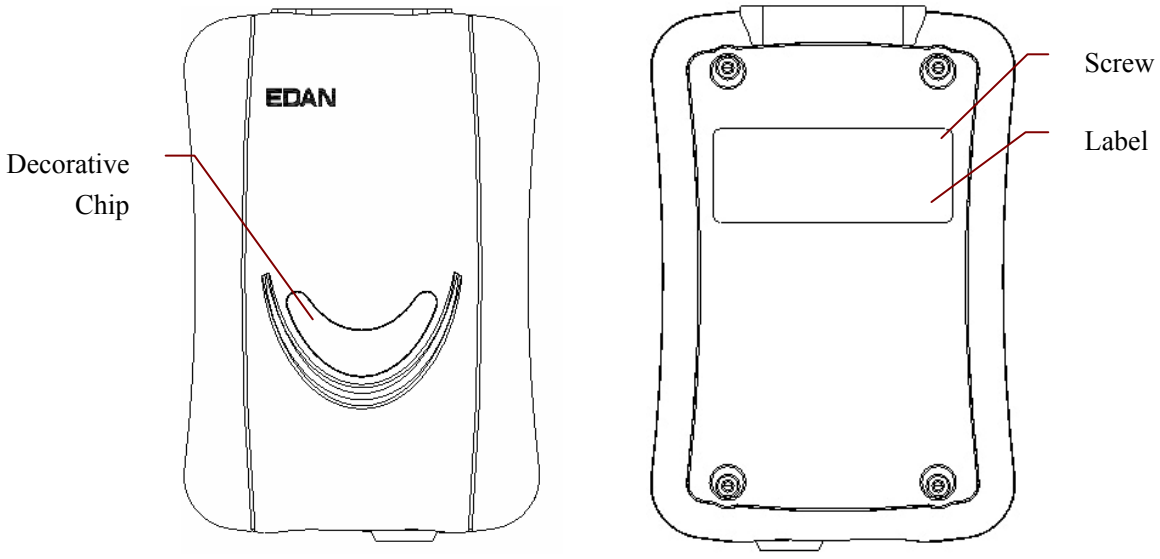
: Caution

Definitions of corresponding pins:

Pin	Signal	Pin	Signal	Pin	Signal
1	C2 / V2	**6**	SH	**11**	F / LL
2	C3 / V3	**7**	NC	**12**	C1 / V1 or NC
3	C4 / V4	**8**	NC	**13**	C1 / V1
4	C5 / V5	**9**	R / RA	**14**	RF (N) /RL or NC
5	C6 / V6	**10**	L / LA	**15**	RF (N) / RL

Note: The left side of "/" is European standard, and the right side is American standard.

Top Panel and Bottom Panel



WARNING

1. Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of the standard IEC/EN 60601-1-1. Therefore anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.
2. The summation of leakage current should never exceed the leakage current limit while several other units are used at the same time.

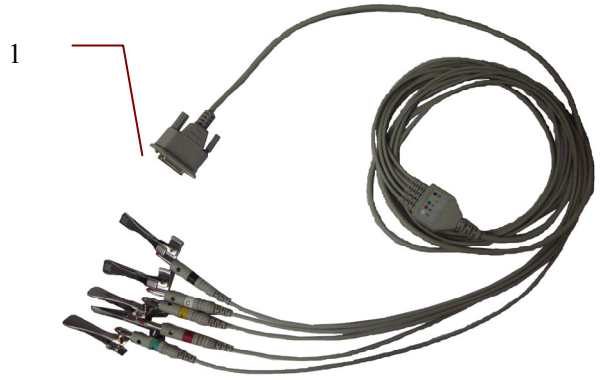
2.2 Features

- Powerful functions, friendly interfaces and easy operation
- 6/7-channel ECG waves are displayed and printed simultaneously
- ECG waves can be frozen and reviewed
- Measurement point adjustment and re-analysis, manual measurement with an electronic ruler of high precision
- Perfect data management and processing functions
- Reports can be printed in PDF, Word, JPG or BMP format
- Supporting multi-language
- Supporting auto measurement
- Automatic baseline adjustment for optimal printing
- High performance filters guarantee stable ECG waveforms
- Real-time analysis, real-time displaying and printing 6 or 7 leads simultaneous ECG waveforms
- Supporting editing diagnosis template
- Two analysis functions including Normal ECG and HRV analysis

Chapter 3 Assembling VE-1010 VET PC ECG System

WARNING

1. Use a special grounded socket to get accurate voltage and current.
2. When using a notebook computer with a two-prong plug, please connect a grounded printer to avoid power interference.



Patient Cable for Resting ECG

Sampling Box

USB Cable for Resting ECG

For resting ECG,

1. Insert plug 1 of the patient cable into socket 2 of the sampling box.
2. Insert plug 4 of the USB cable into socket 3 of the sampling box.
3. Insert plug 5 of the USB cable into the USB socket of the PC.
4. Connect a printer to the PC.
5. Insert the LPT softdog into the parallel interface of the PC, or insert the USB softdog into the USB socket of the PC.
6. Make sure that the parts above are properly connected, and then connect the PC, and the printer to the power supply.

Chapter 4 Installing VE-1010 VET PC ECG Software

4.1 System Running Environment

4.1.1 Requirements on the Hardware of the PC

CPU:	Pentium P4, Celeron D 310 or above
System Memory (RAM):	512MB or above
Main Board	Recommend the main board of Intel chipset
Hard Disk:	40G or above
Printer:	ink jet printer of more than 600 dpi or laser printer Recommend HP2035, HP5568, CANON3500, CANON1800
Display:	17" TFT (1024×768 resolution) or 19" TFT (1440×900 resolution), 16 bit actual color, regular icon and font setup
Others:	CD-ROM (24 × or above)

4.1.2 Requirements on the Software of the PC

- ♦ Windows XP PROFESSIONAL SP2/SP3, Windows Vista (32/64 bit) or Windows 7 (32/64 bit)
- ♦ MSDE2000 (Microsoft SQL Server 2000 Desktop Engine) or Microsoft SQL Server 2005 Express

Note: Ensure that there is a graphic driver installed in the PC. Otherwise, the displayed ECG waves may be abnormal.

CAUTION

Ensure that there is no other database software in the PC in which our software will be installed.

4.2 About Installation Interface

Insert the installation CD into CD-ROM, and double-click on **Setup.exe**

on the installation CD to open the following installation interface.

Figure 4-1 Installation Interface

Click on the **Install** button to install VET PC ECG. Click on the **Next** button continually during installation.

After installing VET PC ECG, click on the **Install** button on the installation interface. Then the **Environment Detection** interface pops up. Check the installing status of all the components. If the **Environment Detection** interface shows that a certain component needs to be installed, please install it manually.

Click on the **Help** button to see the installation guide.

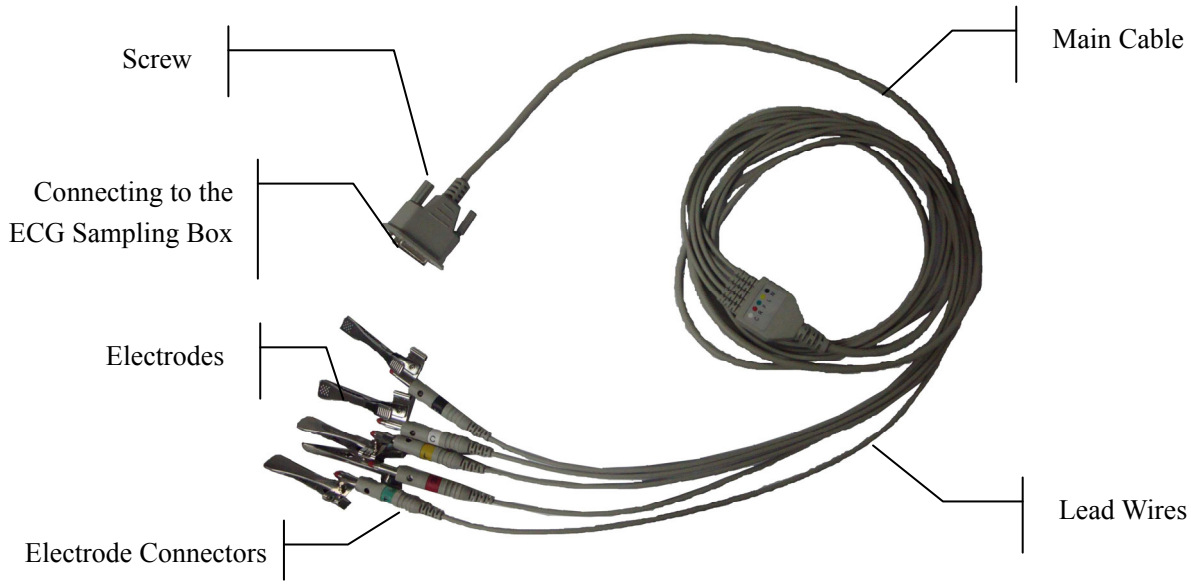
For details on installing VE-1010 VET PC ECG software, please refer to *VE-1010 Veterinary PC ECG Installation Guide.*

Chapter 5 Preparations before Operation

WARNING

The performance and electric shock protection can be guaranteed only if original EDAN patient cable and electrodes are used.

5.1 Connecting the Patient Cable to Electrodes



Electrode includes one chest lead wire and four limb wires connected to electrodes according to the colors and identifiers.

1. Connect the patient cable to the ECG sampling box. For details, see Chapter 3, “Assembling VE-1010 VET PC ECG System”.
2. Align all lead wires of the patient cable to avoid twisting, and connect the lead wires to the corresponding electrodes according to the colors and identifiers. Firmly attach them.

5.2 Attaching Electrodes

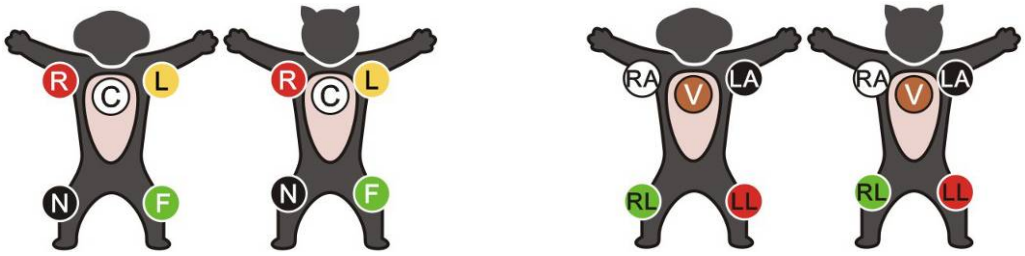
The identifier and color code of electrode connectors used complies with IEC requirements. In order to avoid incorrect connections, the electrode identifier and color code is specified in Table 5-1. Moreover the equivalent code according to American requirements is given too.

Table 5-1 Electrodes, Identifier and Color Code

	European		American	
Electrodes	**Identifier**	**Color code**	**Identifier**	**Color code**
Right fore limb	R	Red	RA	White
Left fore limb	L	Yellow	LA	Black
Right rear limb	N or RF	Black	RL	Green
Left rear limb	F	Green	LL	Red
Chest	C	White	V	Brown

As the following pictures show, the respective positions of the electrodes are:

European Standard **American Standard**



Dog **Cat** **Dog** **Cat**

Electrodes connection:

1. Clean the electrode area which is a short distance above the ankle or the wrist with alcohol.
2. Daub the electrode area on the limb with gel evenly.
3. Place a small amount of gel on the metal part of the limb electrode clamp.
4. Connect the electrode to the limb, and make sure that the metal part is placed on the electrode area above the ankle or the wrist.
5. Attach all limb electrodes in the same way.

The contacting resistance between the animal and the electrode will affect the quality of ECG greatly. In order to get a high-quality ECG, the skin/electrode resistance must be minimized while connecting electrodes.

WARNING

1. Make sure that all electrodes are connected to the pet correctly before operation.
2. Make sure that the conductive parts of electrodes and associated connectors, including neutral electrodes, do not come in contact with earth or any other conductor.

Chapter 6 Operation Instructions for Resting ECG

Double-click on the shortcut icon  on the desktop to display the Initial interface.

Note: Do not use other software when using VE-1010 VET PC ECG software.

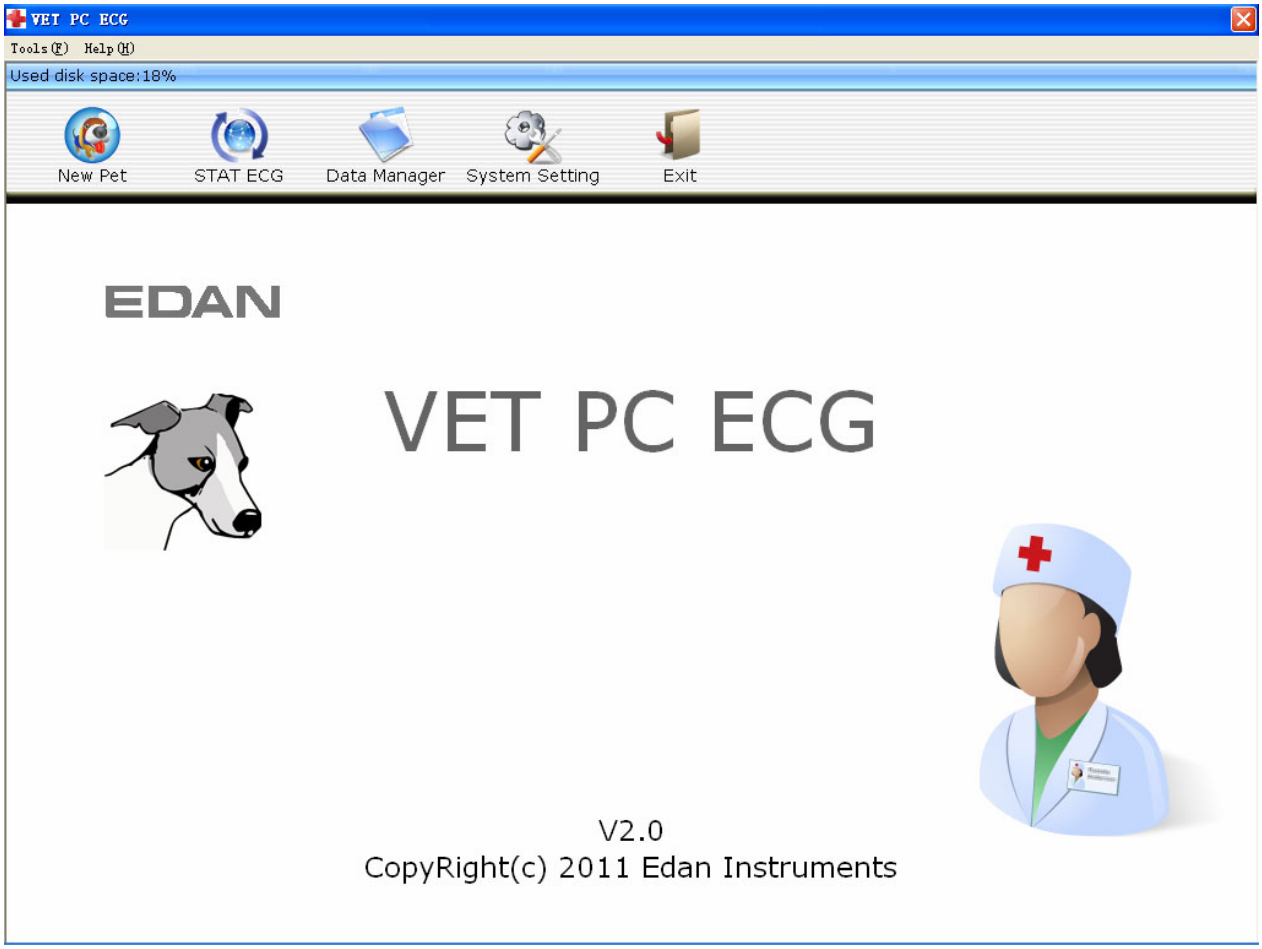


Figure 6-1 Initial Interface

The toolbar contains five buttons. From left to right, they are **New Pet, STAT ECG**, **Data Manager**, **System Setting** and **Exit**.

Below the toolbar, the software name, version number and copyright information can be seen.

Click on **Help (H)** to see the help information.

Click on the **Exit** button on the Initial Interface to exit the system.

6.1 Selecting a Pet Record to Start a New Test

Click on the **Data Manager** button on the Initial Interface (Figure 6-1) to open the **Data Manager** interface (Figure 6-2).

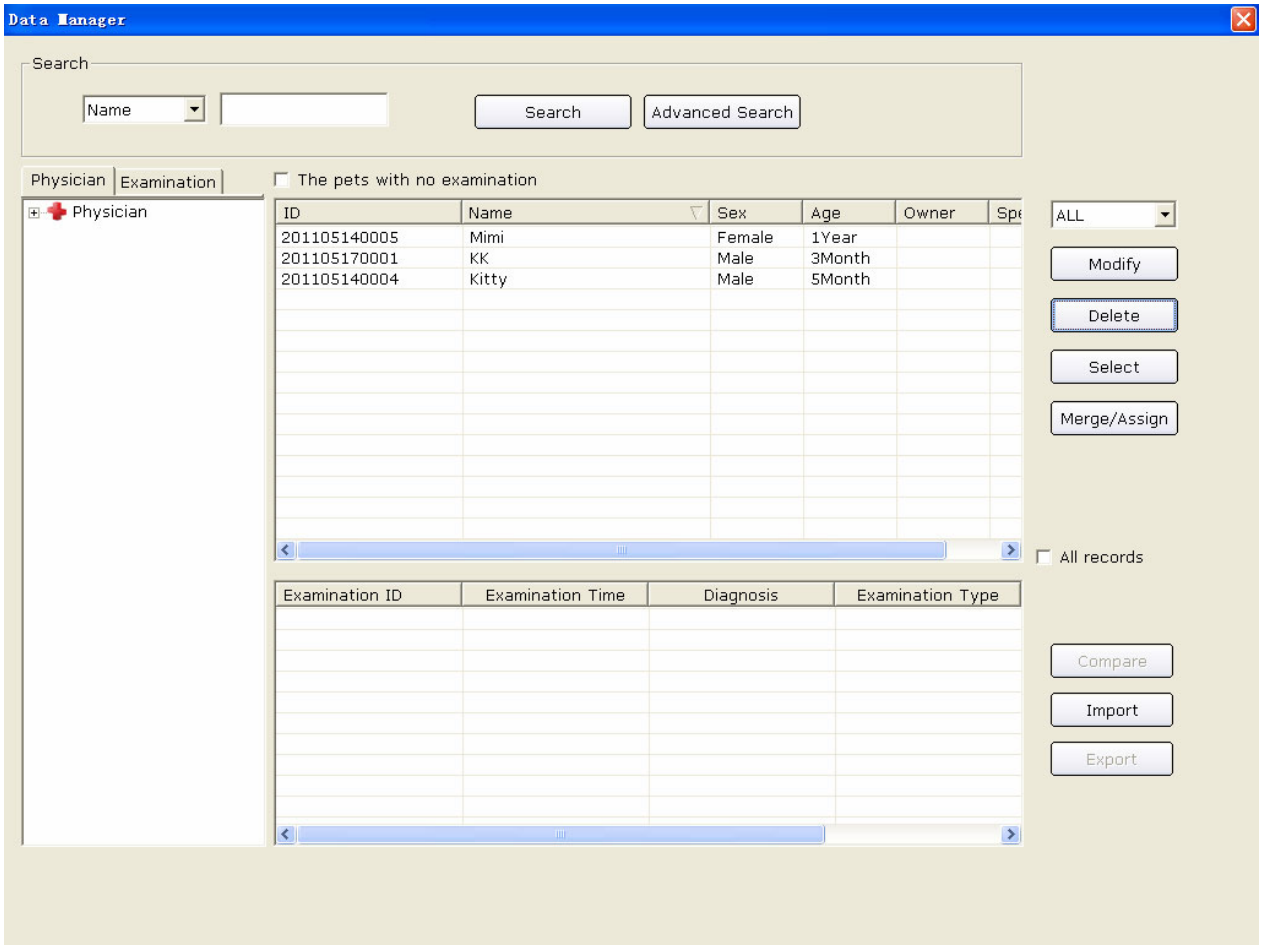
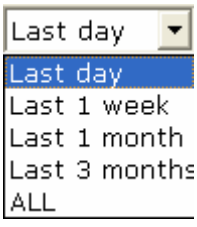
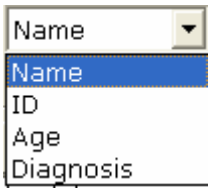


Figure 6-2 Data Manager Interface

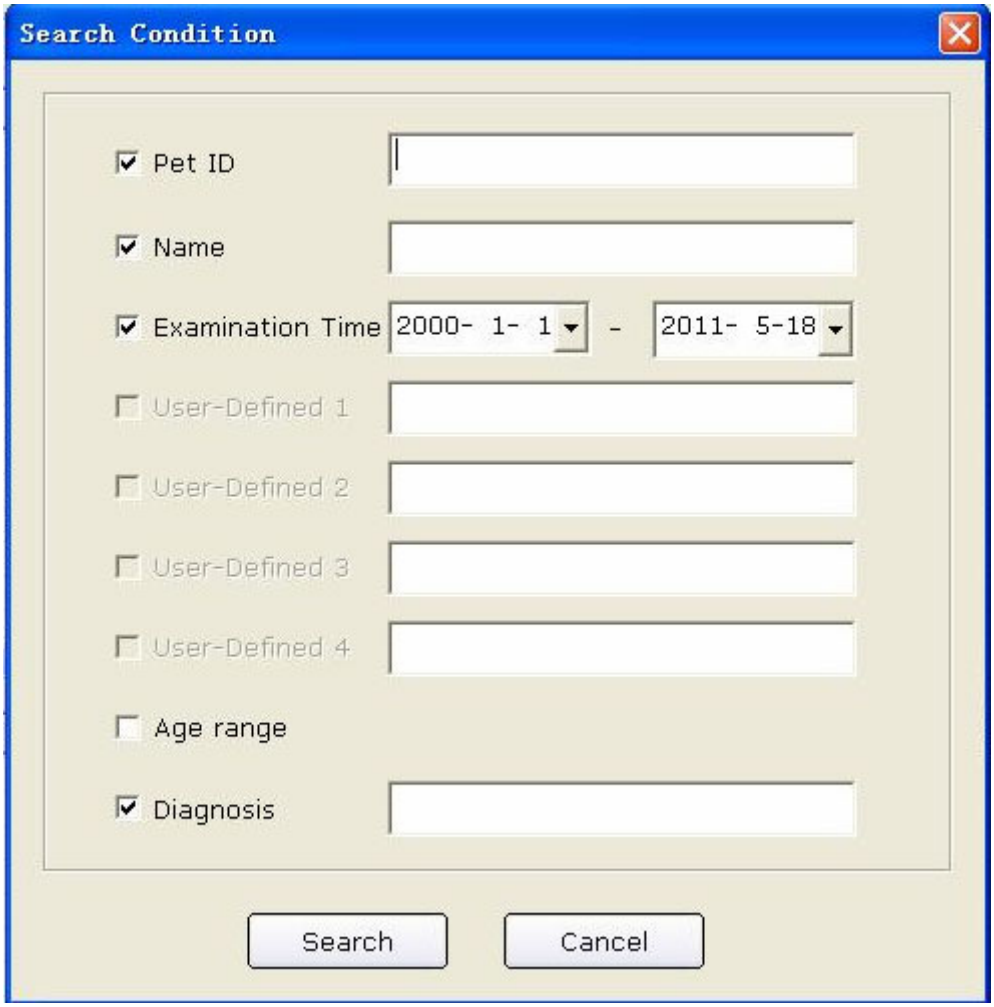
1. Select a search item in the pull-down list on the **Data Manager** interface. Then all the pet records which meet the search condition are listed in the pet information list.



2. Or select a search item in the pull-down list, enter the corresponding information in the right textbox, and then click on the **Search** button. All the pet records which meet the conditions will be displayed in the pet information list.



3. Or click on **Advanced Search** to display the **Search Condition** window. Enter the search conditions, and click on the **Search** button, and all the pet records which meet the conditions will be displayed in the pet information list.



4. Select **The pet with no examination**, all pets that registered but didn't take any examination will be displayed in the pet information list.

5. Select All records, all examined pet records will be displayed in the pet record list. Otherwise, only the records of selected pet will be displayed.

6. Click on the pet record in the pet information list and click on the **Select** button to open the **Pet information** Interface. Or double-click on the pet record in the pet information list to open the **Pet Information** interface.

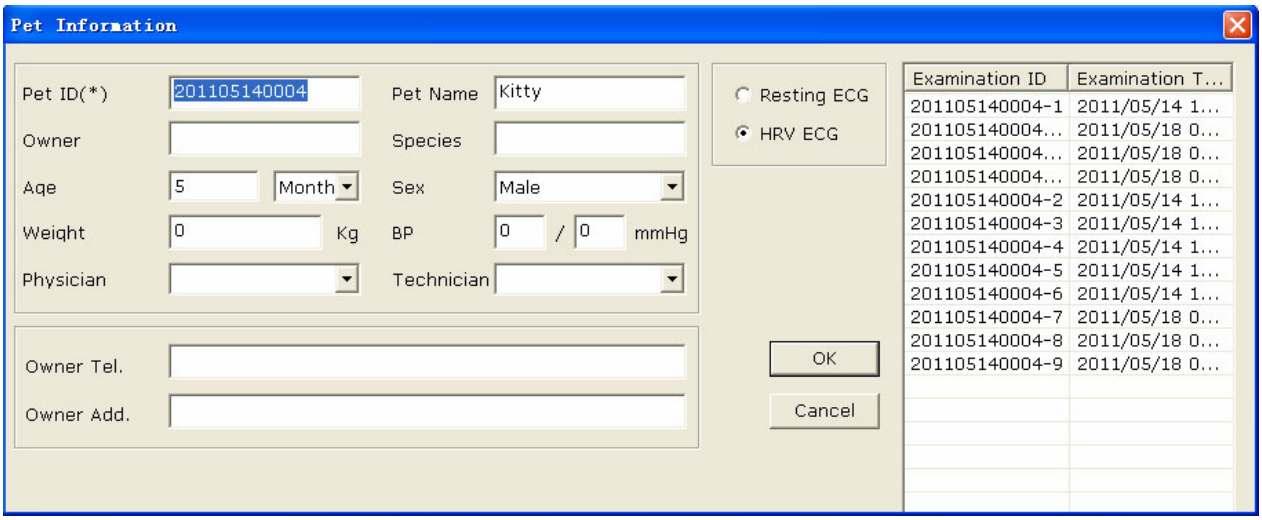


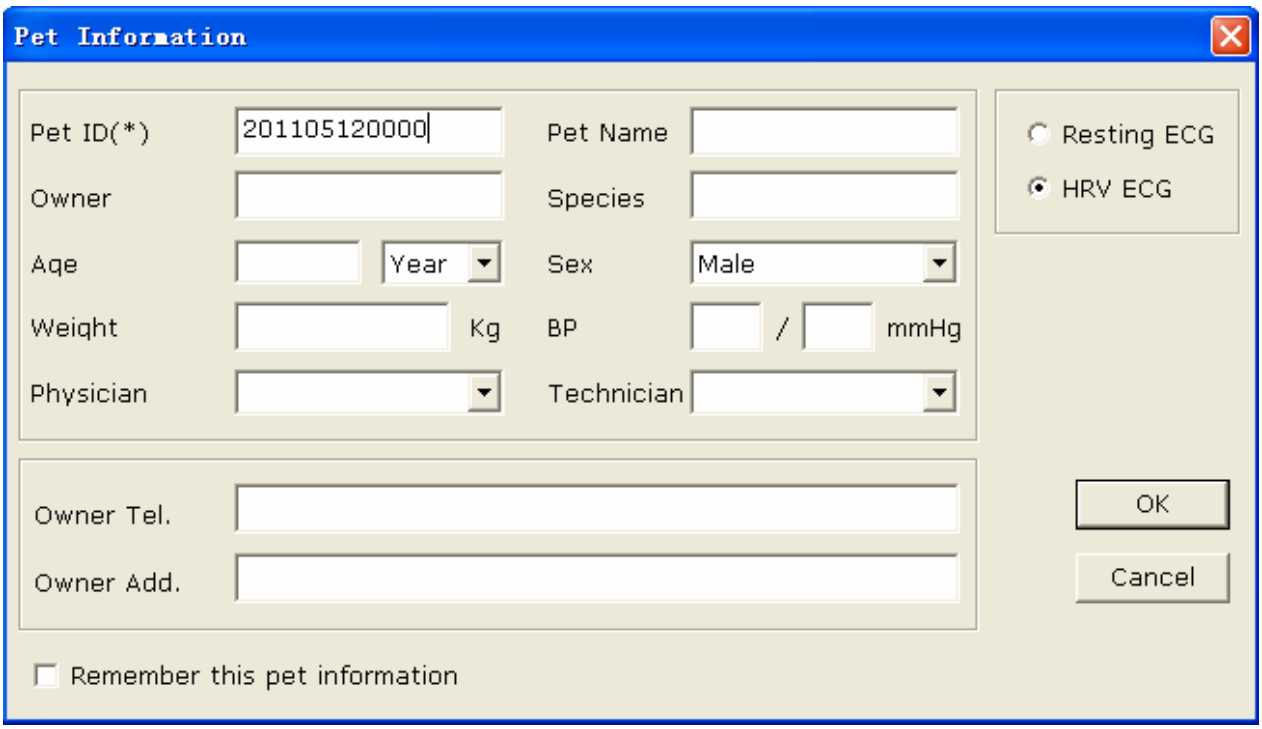
Figure 6-3 Pet Information Interface

Note: Click on an option in the pet information list, such as ID, name, etc, and then all the pet records will be arranged in sequence.

6.2 Entering New Pet Interface

If the pet is a new one, you can click on the **New Pet** button 

on the Initial Interface (Figure 6-1) to display the **Pet information** interface.



Then you need to input the pet's related information.

1. Input basic information, such as pet ID, pet name, sex, age, etc.

You can enter the physician name or the technician name directly in the **Physician** or **Technician** text box, and click on the **OK** button to save it on the **Pet Information** interface. You can click on the pull-down list next time to select the physician name you entered.

Or, you can enter the physician name or the technician name in the **Physician Name** or **Technician Name** on the **Basic Information** interface (Figure 8-1) and click on the **OK** button to save it. For details, please refer to Section 8.1.

Note: On the **Pet information** interface, Pet ID is a must. You can use the number generated by the system or input a number manually. Pet ID can be a random character string excluding '/', '\', ':', '*', '?', '<', '>', '|' and '%'.

2. Enter User-defined information.

User-defined 1/2/3/4: You can input other related information such as pets' medical records.

User-defined 1/2/3/4 can be set on the **Basic Information** setup interface (Figure 8-1). Before setting them, the four items on the **Pet information** interface are unavailable. For details, please refer to Section 8.1, "Setting Basic Information".

3. Select **Remember this pet information** function

If you select **Remember this pet information** item, you can view the latest pet information when the **Pet Information** interface is displayed next time.

6.3 Selecting Sampling Type

You can select a sampling type on the **Pet information** interface.

6.4 Sampling Resting ECG

After inputting the pet information, click on the **OK** button on the **Pet information** interface to open the ECG sampling interface.

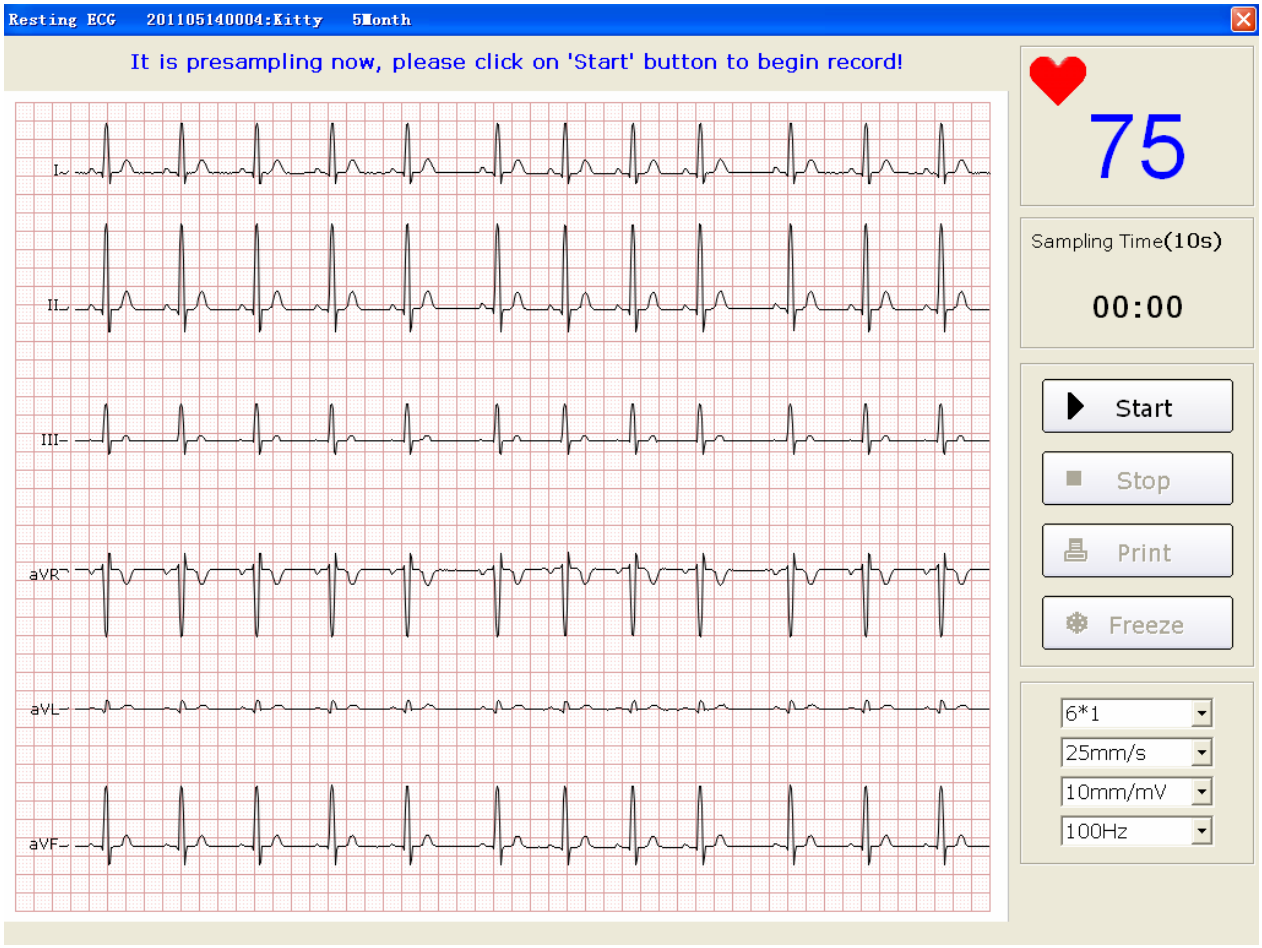
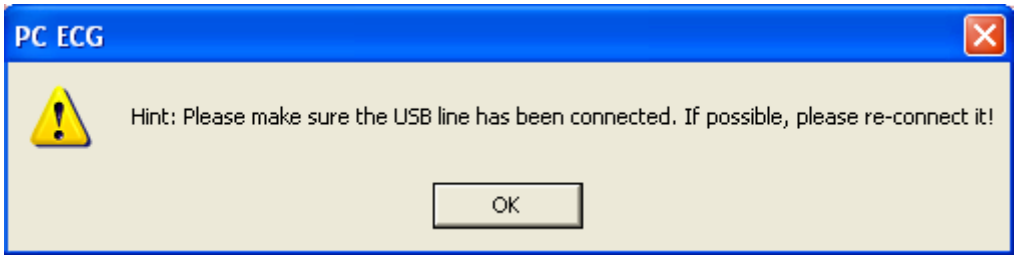


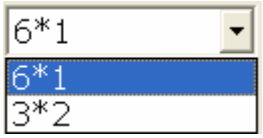
Figure 6-4 Pre-Sampling Interface

Before sampling, if you do not connect the PC to the ECG sampling box, the following hint will pop up.



6.4.1 Specifying Display Mode

6-lead display mode

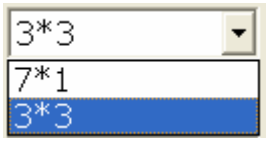


There are two display modes including **6*1** and **3*2** in the 6 Leads mode.

When the display mode is set to **6*1**, 6-channel ECG waves are displayed on one screen.

When the display mode is set to **3*2**, 6-channel ECG waves are displayed in 2 groups of 3 on one screen.

7-lead display mode

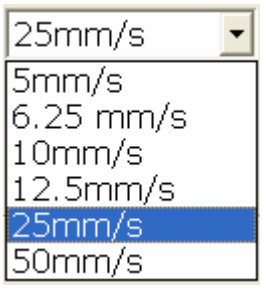


There are two display modes including **7*1** and **3*3** in the 6 Leads mode**.**

When the display mode is set to **7*1**, 7-channel ECG waves are displayed on one screen.

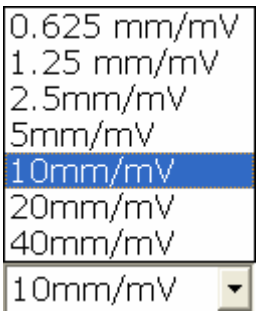
When the display mode is set to **3*3**, 7-channel ECG waves are displayed in 3 groups of 3 on one screen.

6.4.2 Specifying Speed



You can set the paper speed to **5mm/s, 6.25mm/s， 10mm/s, 12.5mm/s, 25mm/s** or **50mm/s**.

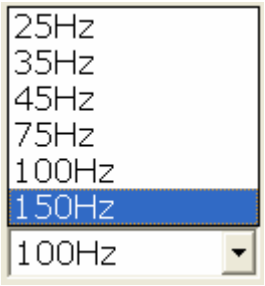
6.4.3 Specifying Gain



You can set the indicated length of 1mV ECG on the paper.

You can set the gain to **0.625mm/mV, 1.25mm/mV, 2.5mm/mV, 5mm/mV, 10mm/mV，20mm/mV** or **40mm/mV.**

6.4.4 Specifying Lowpass Filter



Lowpass Filter restricts the bandwidth of input signals. The cutoff frequency can be set to **25Hz**, **35Hz**, **45Hz**, **75Hz**, **100Hz**, or **150Hz**. The input signals whose frequency is higher than the set cutoff frequency will be attenuated.

6.4.5 Recording ECG Data

When the pre-sample ECG waves are steady, you can click on the **Start** button to save the sampled ECG data to the designated directory. Please refer to data saving specification in Section 8.1.4, "Specifying the Storage Path of the ECG Data".

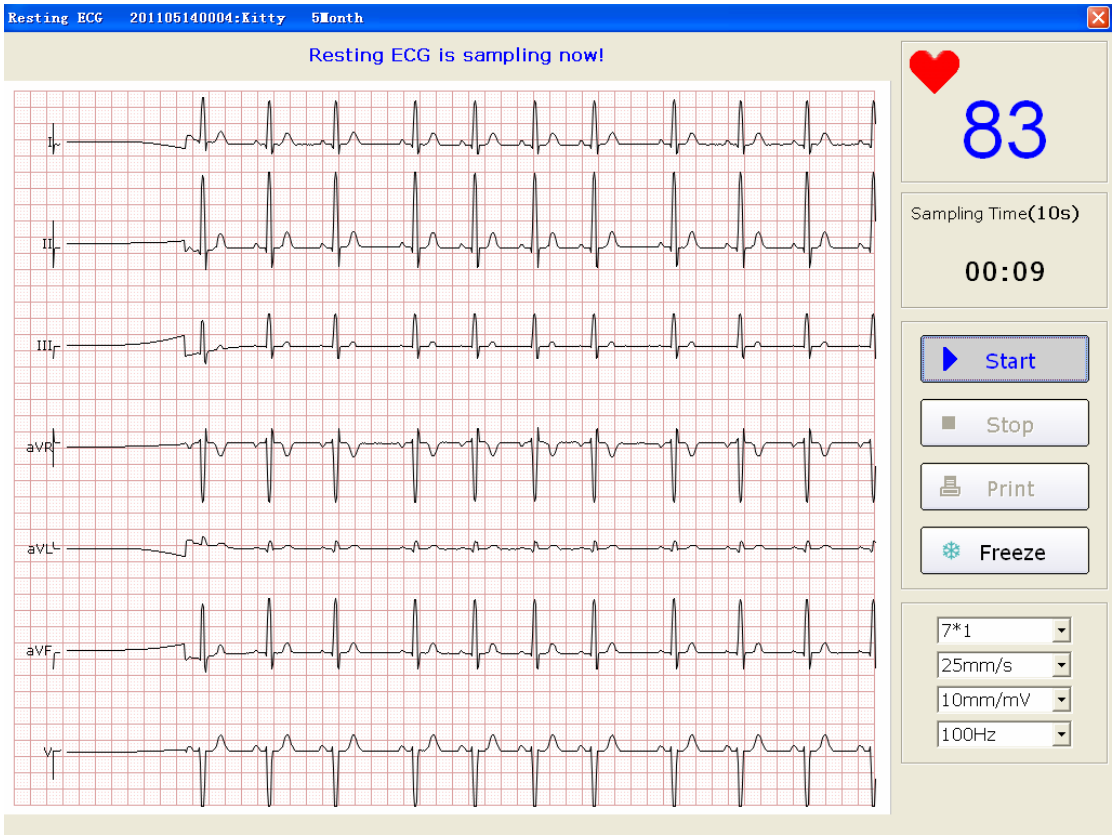


Figure 6-5 ECG Sampling Interface

Note: After you click on the **Start** button, the system will save the sampled ECG data. If you don't click on the **Start** button, the system won't save the sampled ECG data.

6.4.6 Stopping Sampling Data

After clicking on the **Start** button, there are two ways to stop sampling data.

1. The system will stop sampling ECG data and display the ECG analysis interface automatically after the ECG sampling time is over. For details on setting ECG sampling time, see Section 9.2.2, "Setting Sampling Time".

2. Before the ECG sampling time is over, you can click on the **Stop** button to stop sampling data and the ECG analysis interface will pop up automatically.

Note:

1. The **Stop** button is available 10 seconds after you click on the **Start** button in the Resting ECG.
2. The **Stop** button is available 30 seconds after you click on the **Start** button in the HRV ECG.

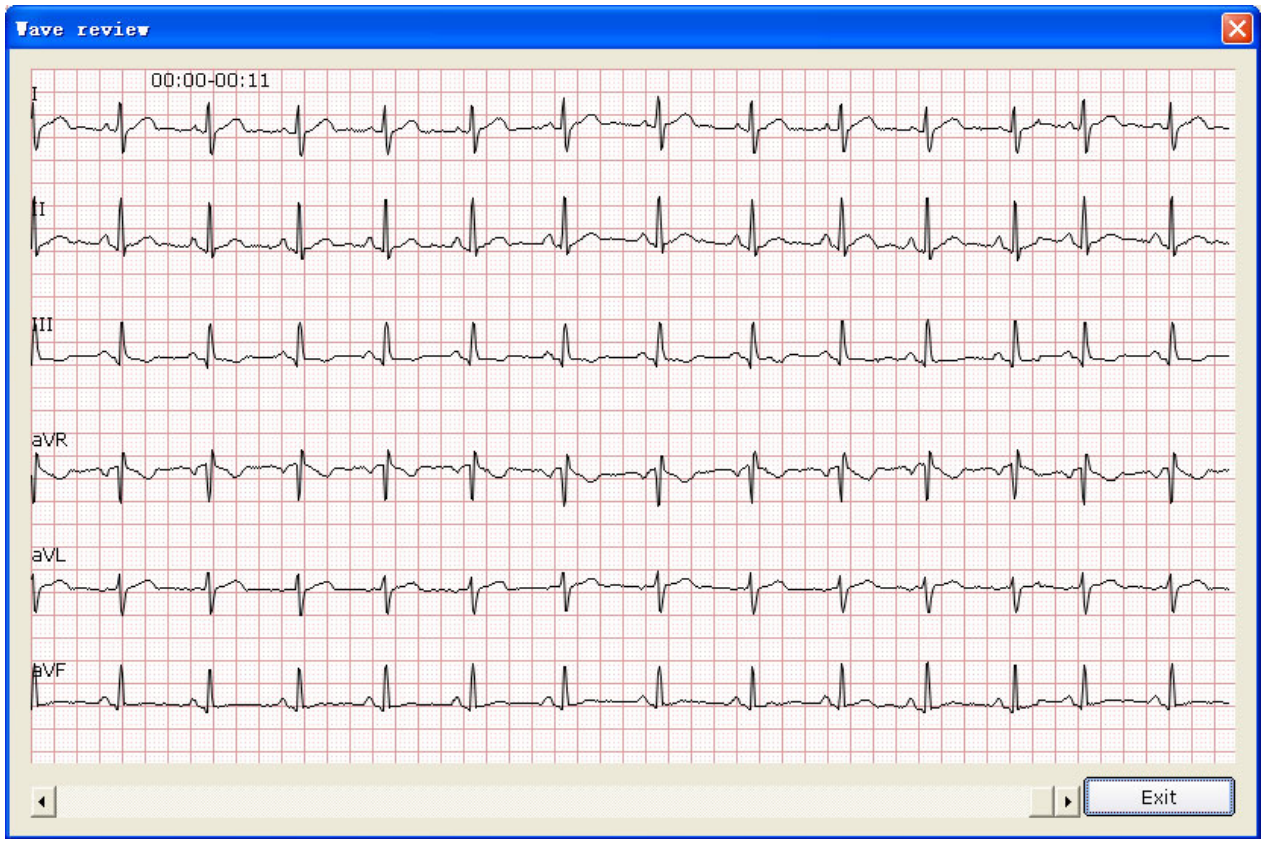
6.4.7 Printing ECG Waves

Click on the **Print** button on the ECG sampling interface to print the ECG waves on the **Wave Review** interface.

Note: You can set the printer type on the print setup interface. There are two options: **white- black** and **color**. The report color is defined by setting the printer type and can be observed on the preview interface. For details on setting the printer type, see Section 9.4, "Printer Setup".

6.4.8 Freezing ECG Waves

Click on the **Freeze** button on the ECG sampling interface (Figure 6-5), the system will display the **Wave review** interface. You can review the waveform by dragging the scrollbar.



Click on **Exit** to return to the ECG sampling interface.

Note: Only 6*1 and 7*1 display modes can be displayed on the Wave Review interface.

6.5 Analyzing ECG Data

You can open the ECG analysis interface in one of the following three ways:

1. Click on the **Start** button, and then the system will stop sampling ECG and display the ECG analysis interface automatically after the ECG sampling time is over.
2. Or click on the **Stop** button to stop sampling after clicking on the **Start** button, and the system will display the ECG analysis interface automatically.
3. Or double-click on an examination record in the examination record list on the **Data Manager** interface (Figure 6-2) to open the ECG analysis interface.

6.5.1 Analyzing Normal ECG

Select one pet record and double-click on the corresponding examination record to open the **Normal Analysis** interface. The interface includes four tabs: **Waveform**, **Average Template, Detail information** and **Rhythm Wave**.

6.5.1.1 Viewing the Waveform

Click on the **Waveform** tab on the Normal ECG Analysis Interface to open the **Waveform** interface (Figure 6-6).

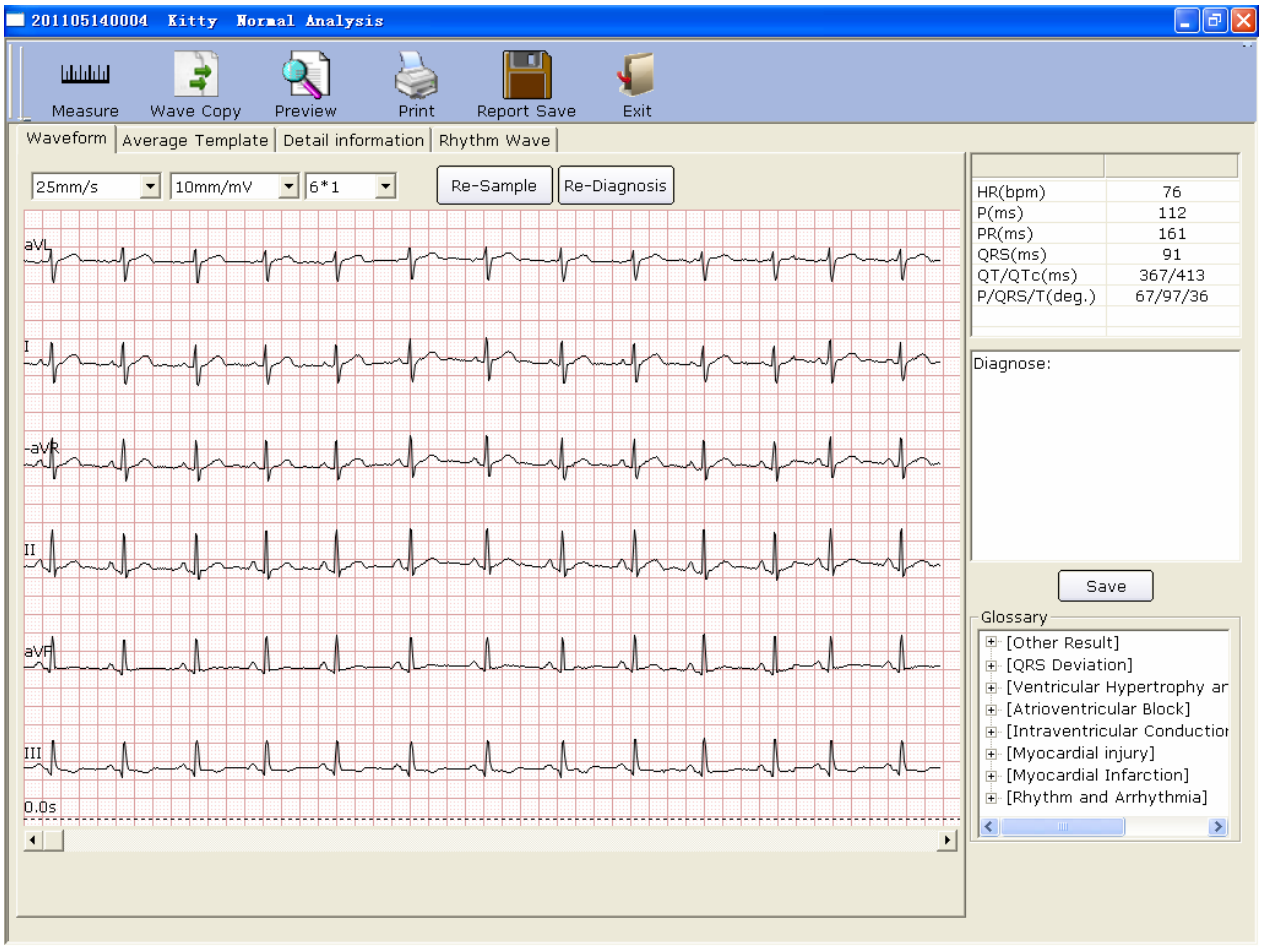


Figure 6-6 Normal ECG - Waveform Interface

You can choose a speed, a gain and a display mode for the displayed waves from the pull-down lists.

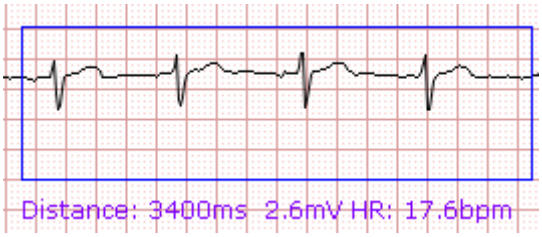
As follows:

Designation	**Description**
HR	Heart Rate
P(ms)	P-wave duration of the current lead
PR(ms)	P-R interval of the current lead
QRS(ms)	QRS complex duration of the current lead
QT/QTc(ms)	Q-T interval of the current lead/Normalized QT interval
P/QRS/T(deg.)	Dominant direction of the average integrated ECG vectors

Click on the **Re-Sample** button and then the system can re-sample ECG data.

Click on the **Re-Diagnosis** button and then the system can re-diagnose the 10s ECG data on the screen automatically.

Click on the **Measure** button on the **Waveform** interface (Figure 6-6), then click on one point of the wave, and then drag the mouse to another point. The distance, amplitude difference and heart rate between the two points will be displayed.



Right click on the mouse or click on the **Measure** button again to cancel the operation.

Note:

1. You can measure the distance between any two points more than once after running the ruler. The last measure track and data will be displayed after the measurement.
2. Only ECG waves can be measured.

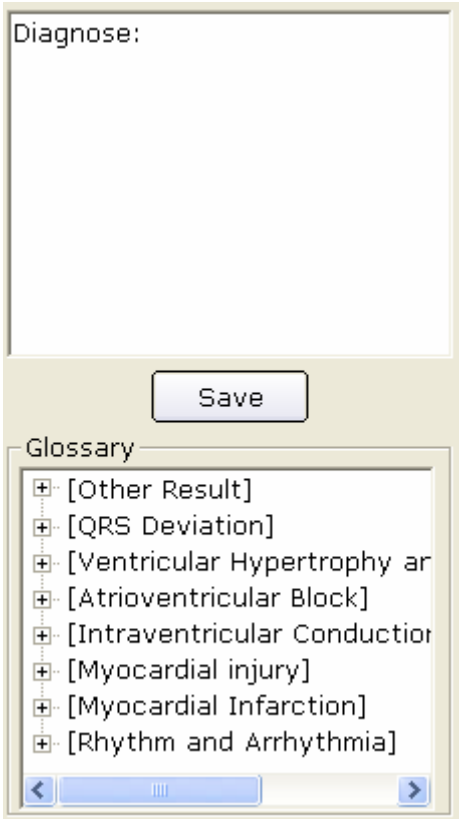
Click on the **Wave Copy** button on the **Waveform** interface (Figure 6-6), drag the mouse to copy the wave you need, and then you can paste it in a file.

Right click on the mouse or click on the **Wave Copy** button again to cancel the operation.

Parameters

Double-click on a parameter, and then you can modify it. Then click on the **Save** button to save the modification.

To Edit Diagnosis Result on the Waveform Interface



To Edit the Diagnosis Result,

1. Enter your own opinions in the diagnosis textbox, and then click on the **Save** button.

2. Or double-click on the necessary results required to be added in the **Glossary** textbox, and the selected results will be displayed in the diagnosis textbox, and then click on the **Save** button.

6.5.1.2 About the Average Template Interface

Click on the **Average Template** tab on the normal ECG analysis interface to open the average template interface (Figure 6-7). You can analyze average templates on this interface.

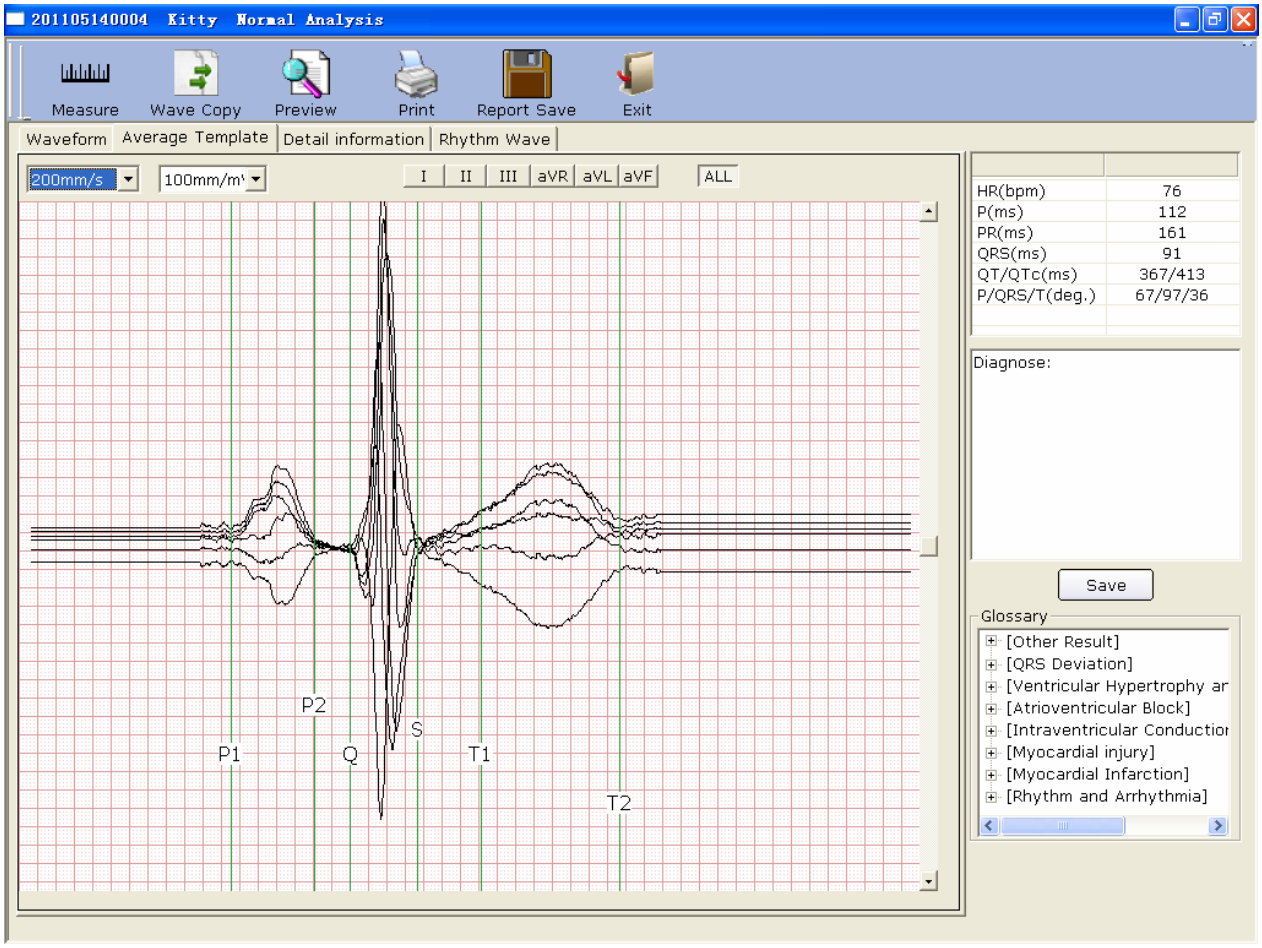
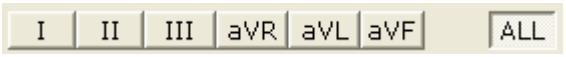


Figure 6-7 Normal ECG - Average Template Interface

You can press a lead button in  to display magnified average templates of this lead.

When you press **ALL**, magnified average templates of all leads will be overlapped with the same central axis.

You can drag marker lines of P1, P2, Q, S, T1 and T2 on average templates.

P1 is the start point of P wave, P2 is the end point of P wave, Q marks the position of Q point, S marks the position of S point, T1 is the start point of T wave and T2 is the end point of T wave. You can move these lines by dragging on the mouse and the mouse will turn to a hand pointer when it is put on these marks. You can also use the arrows key on the keyboard to move these marks, and the corresponding parameter values will change.

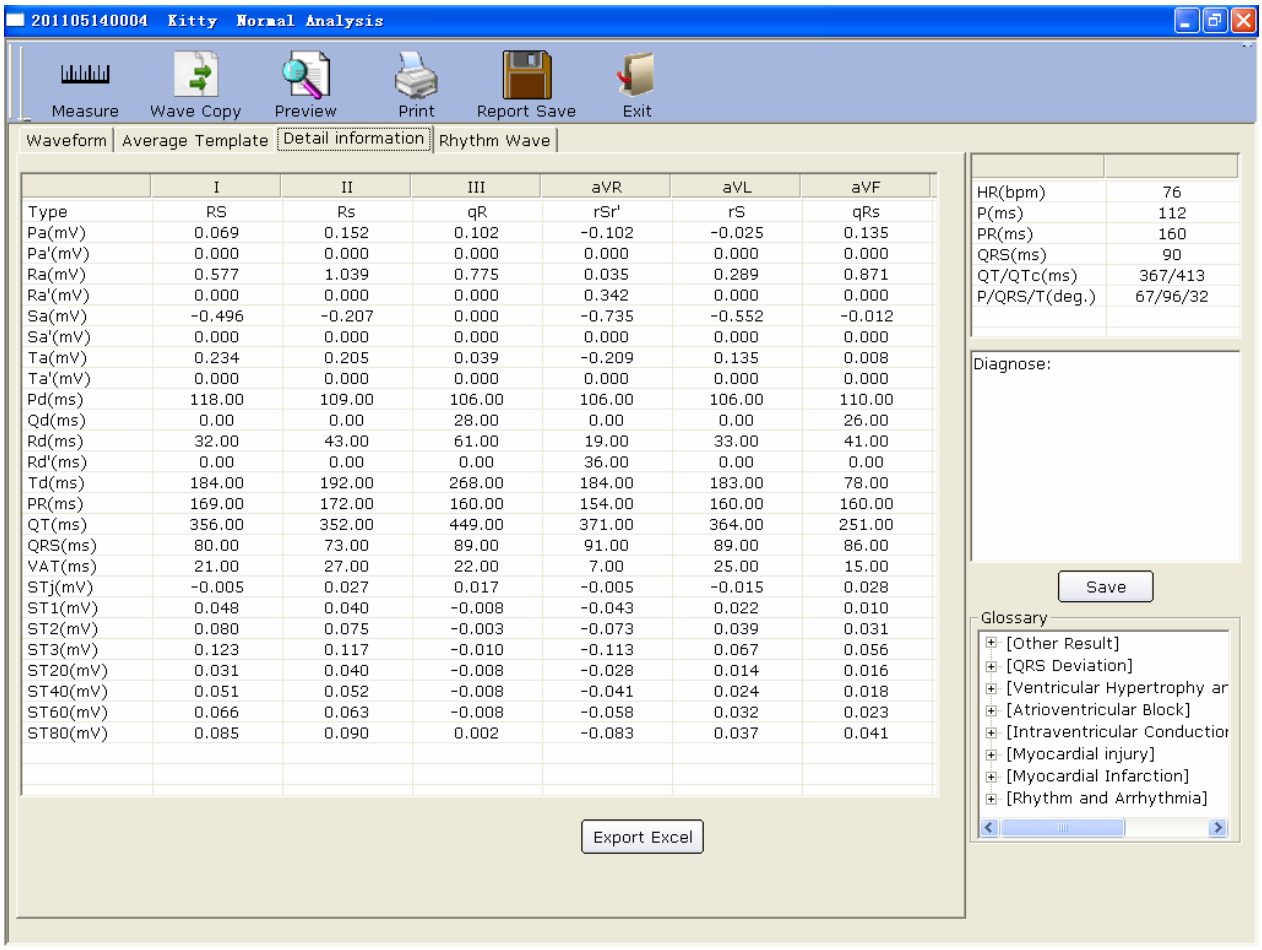
You can set the speed and the gain of average templates.

To Edit Diagnosis Result on the Average Template Interface

For details, refer to Section 6.5.1.1, “Viewing the Waveform”.

6.5.1.3 About the Detail Information Interface

Click on the **Detail information** tab on the normal ECG analysis interface to open the detail information interface. This interface displays lead parameter values as Figure 6-8 shows.



	I	II	III	aVR	aVL	aVF
Type	RS	Rs	qR	rSr'	rS	qRs
Pa(mV)	0.069	0.152	0.102	-0.102	-0.025	0.135
Pa'(mV)	0.000	0.000	0.000	0.000	0.000	0.000
Ra(mV)	0.577	1.039	0.775	0.035	0.289	0.871
Ra'(mV)	0.000	0.000	0.000	0.342	0.000	0.000
Sa(mV)	-0.496	-0.207	0.000	-0.735	-0.552	-0.012
Sa'(mV)	0.000	0.000	0.000	0.000	0.000	0.000
Ta(mV)	0.234	0.205	0.039	-0.209	0.135	0.008
Ta'(mV)	0.000	0.000	0.000	0.000	0.000	0.000
Pd(ms)	118.00	109.00	106.00	106.00	106.00	110.00
Qd(ms)	0.00	0.00	28.00	0.00	0.00	26.00
Rd(ms)	32.00	43.00	61.00	19.00	33.00	41.00
Rd'(ms)	0.00	0.00	0.00	36.00	0.00	0.00
Td(ms)	184.00	192.00	268.00	184.00	183.00	78.00
PR(ms)	169.00	172.00	160.00	154.00	160.00	160.00
QT(ms)	356.00	352.00	449.00	371.00	364.00	251.00
QRS(ms)	80.00	73.00	89.00	91.00	89.00	86.00
VAT(ms)	21.00	27.00	22.00	7.00	25.00	15.00
STj(mV)	-0.005	0.027	0.017	-0.005	-0.015	0.028
ST1(mV)	0.048	0.040	-0.008	-0.043	0.022	0.010
ST2(mV)	0.080	0.075	-0.003	-0.073	0.039	0.031
ST3(mV)	0.123	0.117	-0.010	-0.113	0.067	0.056
ST20(mV)	0.031	0.040	-0.008	-0.028	0.014	0.016
ST40(mV)	0.051	0.052	-0.008	-0.041	0.024	0.018
ST60(mV)	0.066	0.063	-0.008	-0.058	0.032	0.023
ST80(mV)	0.085	0.090	0.002	-0.083	0.037	0.041

Figure 6-8 Normal ECG - Detail Information Interface

Click on the **Export Excel** button to export an Excel file.

To Edit Diagnosis Result on the Detail Information Interface

For details, refer to Section 6.5.1.1, “Viewing the Waveform”.

6.5.1.4 About the Rhythm Wave Interface

Click on the **Rhythm Wave** tab on the normal ECG analysis interface to open the rhythm wave interface. You can set the gain, the speed and the lead of the displayed ECG waves.

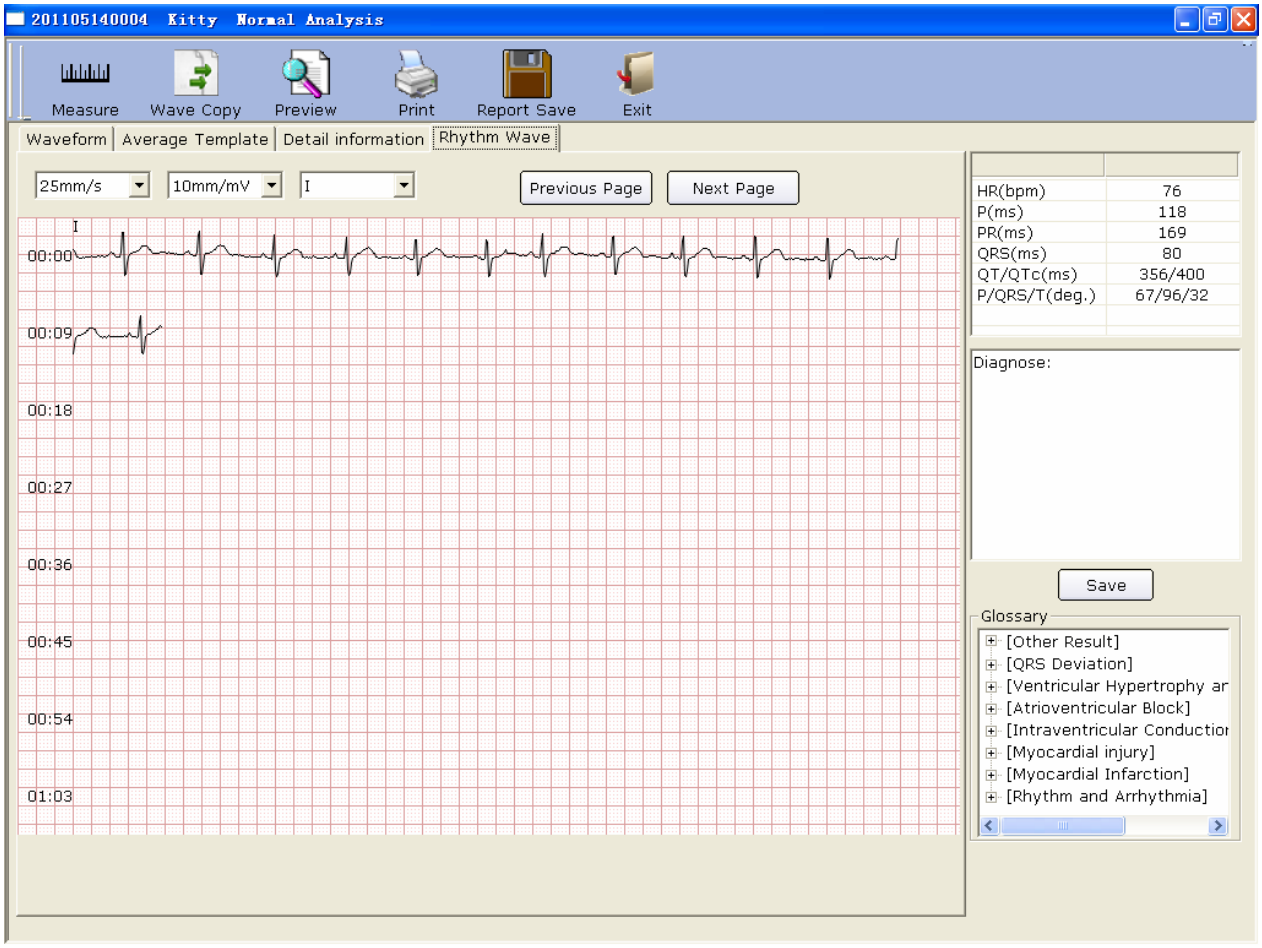


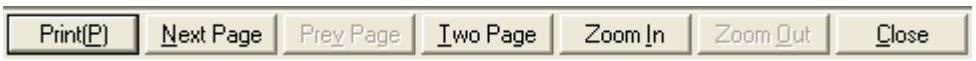
Figure 6-9 Normal ECG - Rhythm Wave Interface

You can click on **Previous Page** or **Next Page** to display the waves of the previous or next page.

Click on one point on the wave, and then drag the mouse to another point. The section of wave you select will be printed.

6.5.1.5 Previewing Normal ECG

Click on the **Preview** button to display the normal ECG preview interface.



is the toolbar on the normal ECG preview interface.

1. Click on the **Next Page** button on the toolbar to switch to the next preview page.
2. Click on the **Two Page** button on the toolbar to preview two pages on one screen simultaneously.
3. Click on the **Zoom In** button on the toolbar to magnify the preview page.

4. Click on the **Zoom Out** button on the toolbar to minify the preview page.

5. Click on the **Close** button to close the normal ECG preview interface and return to the previous interface.

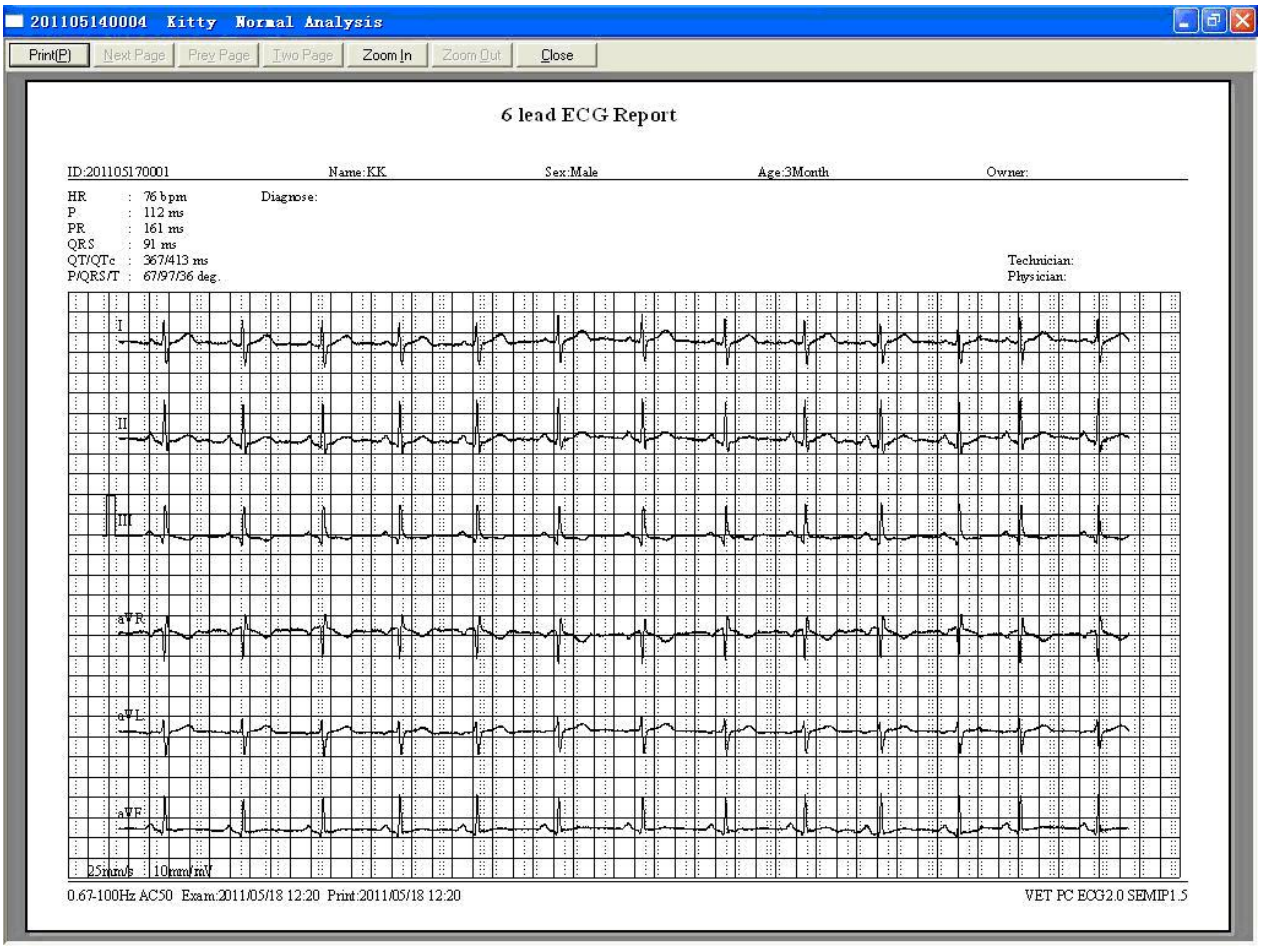


Figure 6-10 ECG Wave

6.5.2 Analyzing HRV

Click on **HRV** to display the HRV ECG analysis interface. The HRV ECG analysis interface includes two tabs: **Auto diagnosis result** and **Waveform**.

Notes:

1. The HRV sampling time can be set on the **Sample Setup** interface.
2. The HRV analysis lead can be selected on the **Sample Setting** interface.

6.5.2.1 Editing the HRV Data on the Auto Diagnosis Result Interface

Click on the **Auto Diagnosis Result** tab to enter Auto diagnosis result interface, which includes: RR Histogram, Histogram of RR Difference, HR trend, Poincare plots, Modified Poincare plots and Spectral analysis.

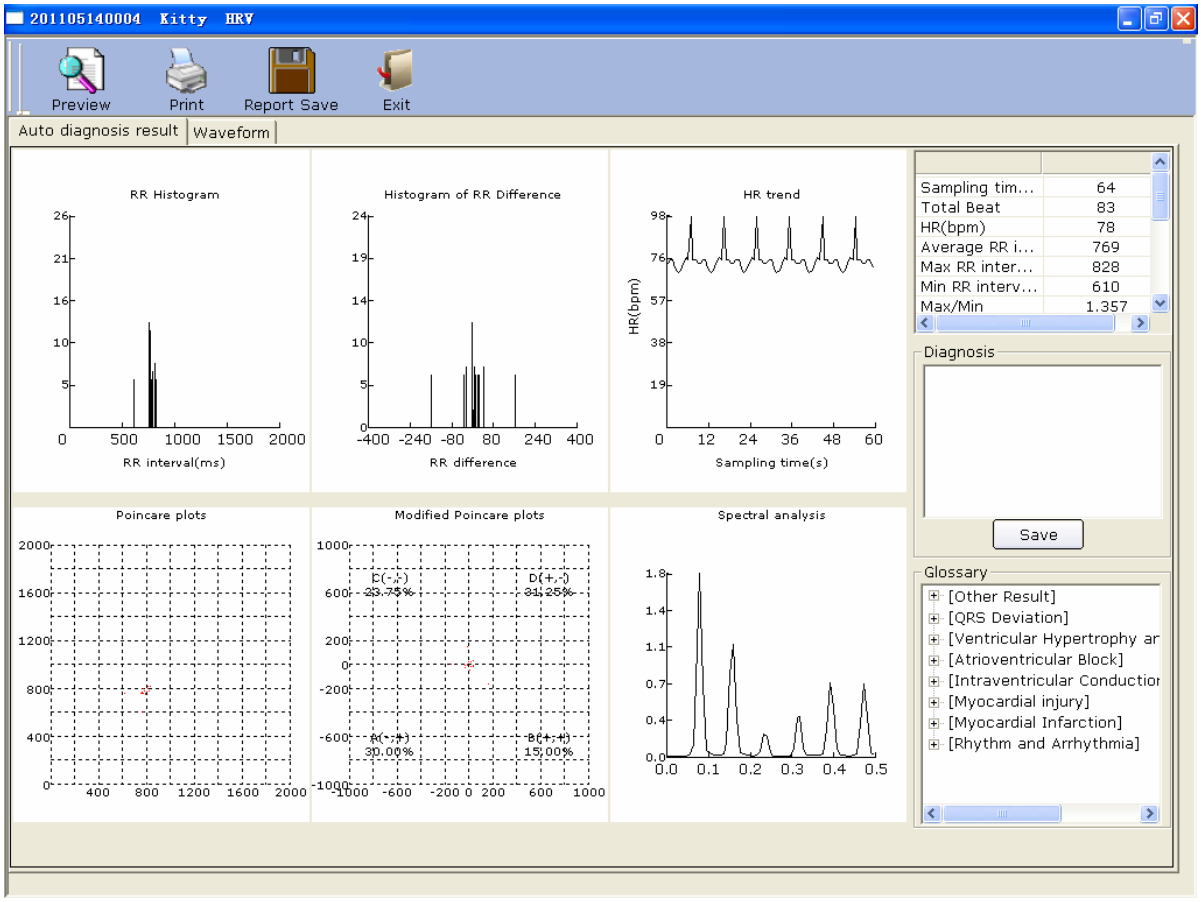


Figure 6-11 Analysis Interface of HRV

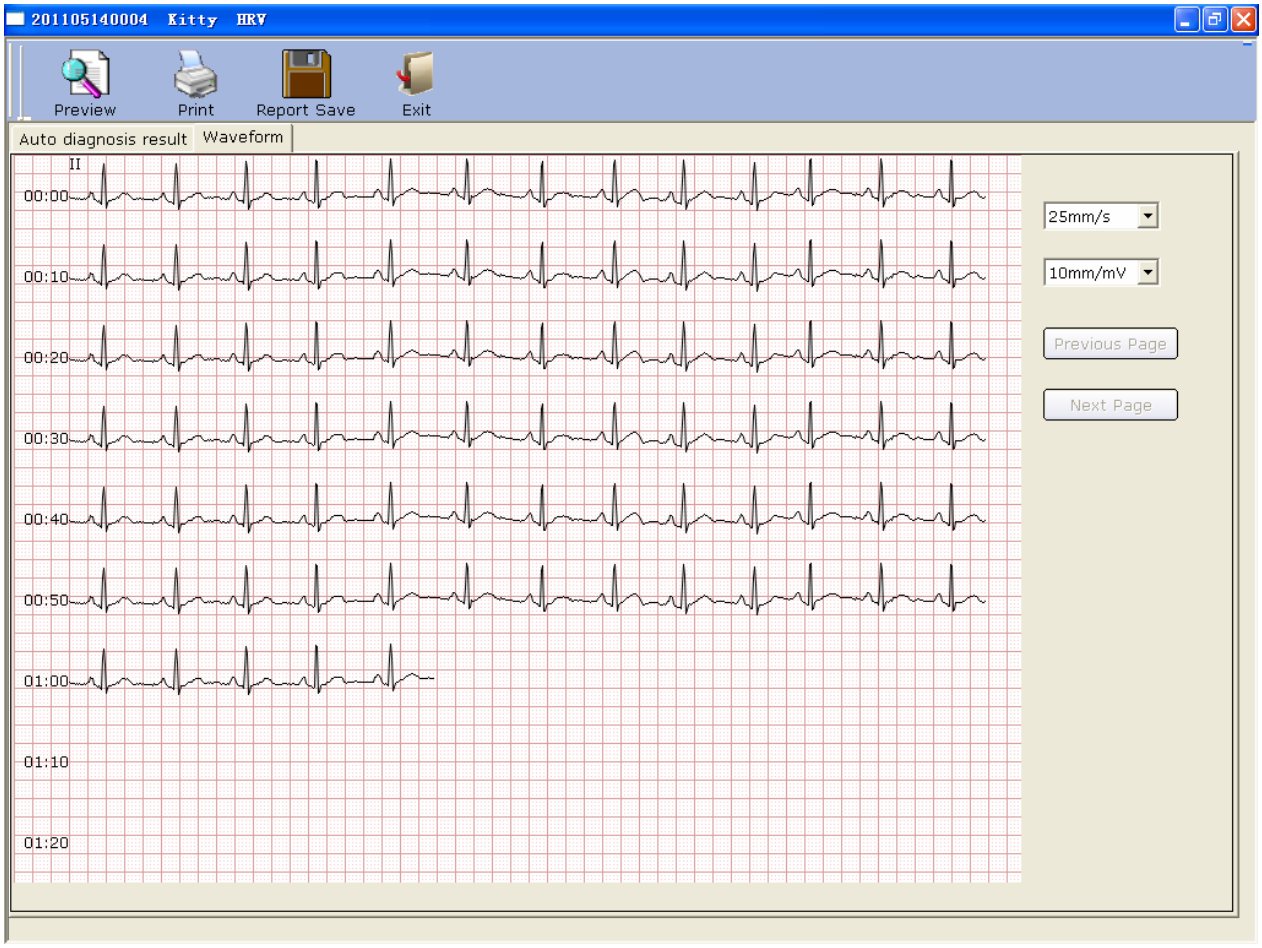
As follows:

Designation	**Definition**
Sampling time	Set sampling time
Total Beat	Total beat number during the measuring course
HR	Heart Rate
Average RR interval	Average RR interval
Max RR interval	Maximum RR interval
Min RR interval	Minimum RR interval
Max/Min	Ratio of Maximum RR interval to Minimum RR interval
SDNN	Standard Deviation of Normal to Normal Intervals
RMSSD	Root Mean Square Successive Difference
LF	Low Frequency
HF	High Frequency
LF (norm)	Standard LF power
HF (norm)	Standard HF power
LF/HF	Ratio of low frequency to high frequency
Total Power	Total Power

User can edit diagnosis result on the **Waveform i**nterface. For details, please refer to Section 6.5.1.1.

6.5.2.2 Editing the HRV Waveform on the Waveform Interface

Click on the **Auto Diagnosis Result** tab to enter Auto diagnosis result interface.



HRV waveform is displayed on the **Waveform** interface. You can drag the mouse on the interface to choose the wave field to be printed. Then click on the **Print** button to print the selected wave field. Click on **Previous Page** or **Next Page** to display the waves of the previous or next page.

6.5.2.3 Previewing HRV

Click on the **Preview** button to open the HRV preview interface. For details, please refer to Section 6.5.1.5.

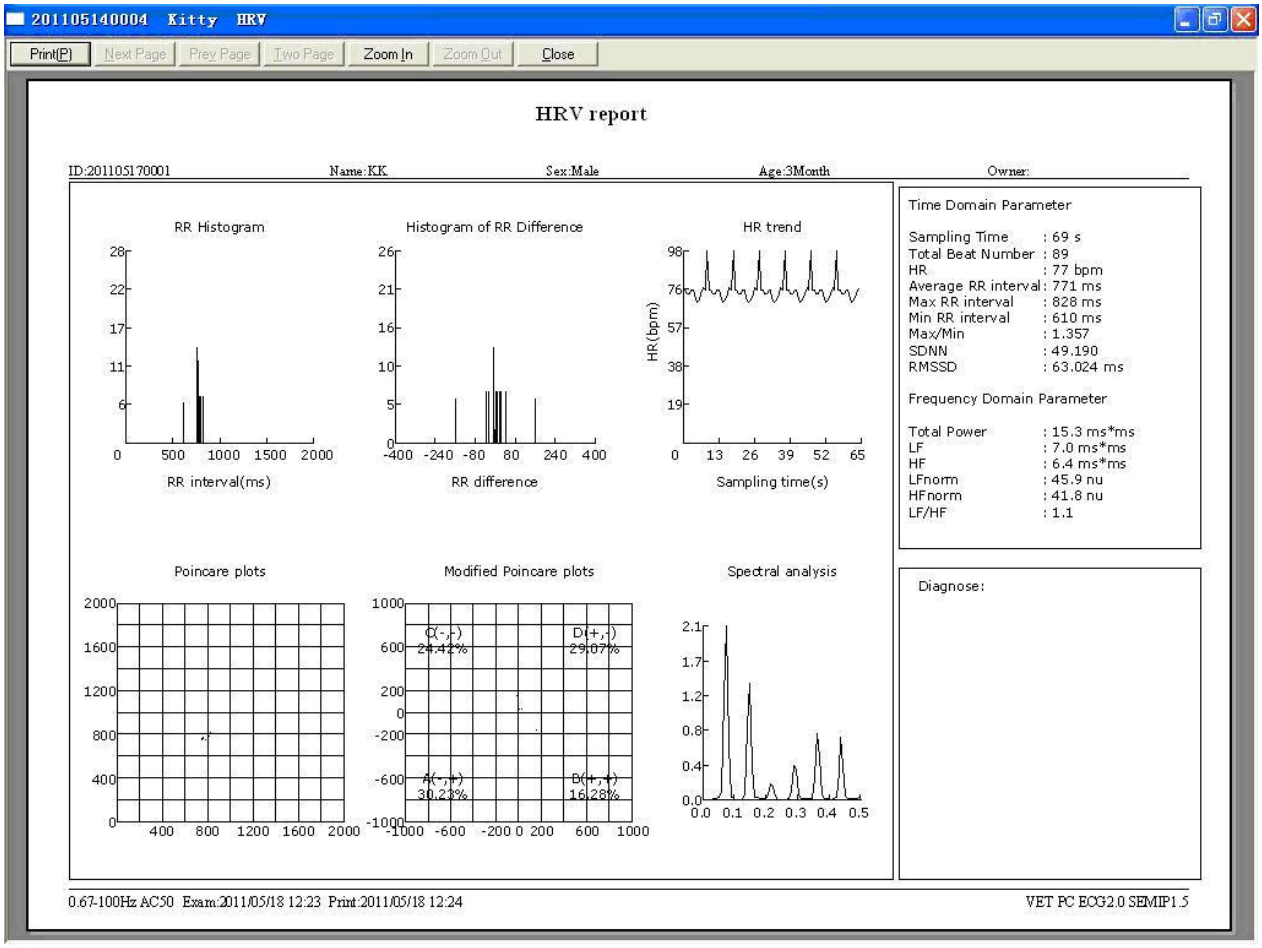
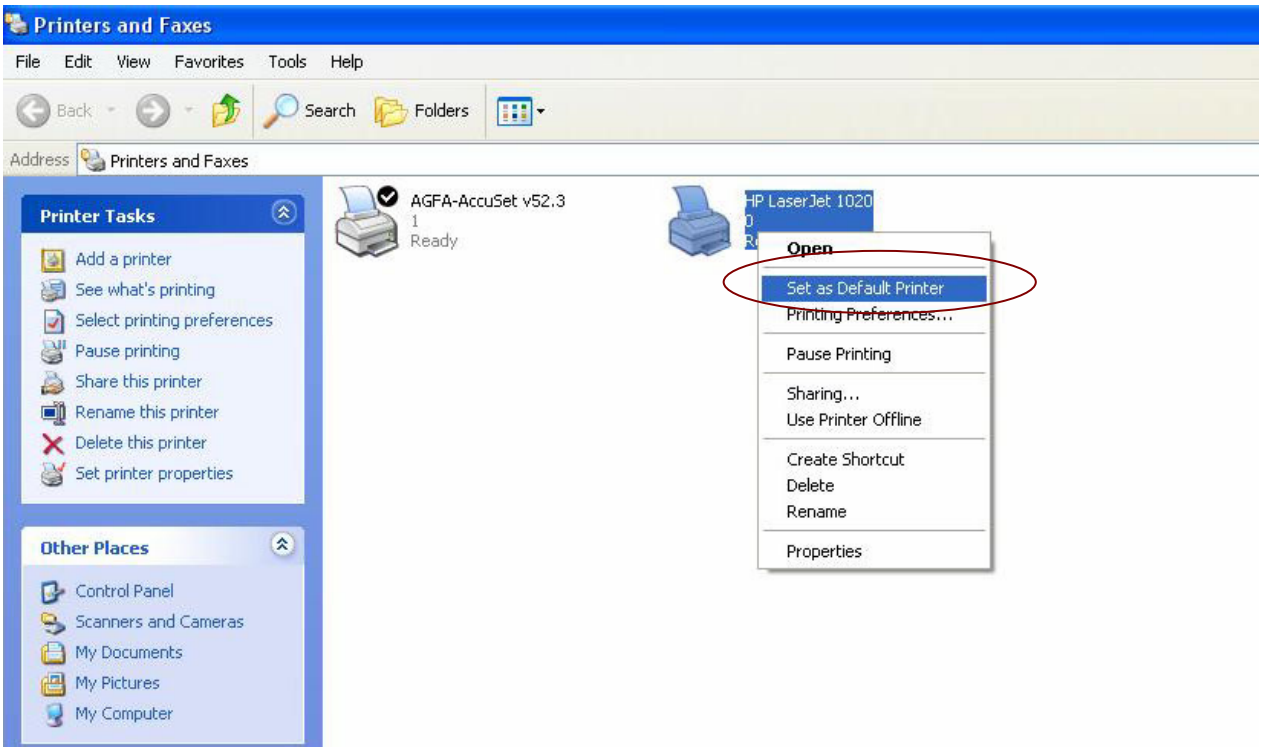


Figure 6-12 HRV Preview Interface

6.5.3 Printing ECG Reports

1. Choose **Start** > **Printers and Faxes**, and then right-click on the icon of the printer used, and select **Set as Default Printer**. Then close the **Printers and Faxes** interface.



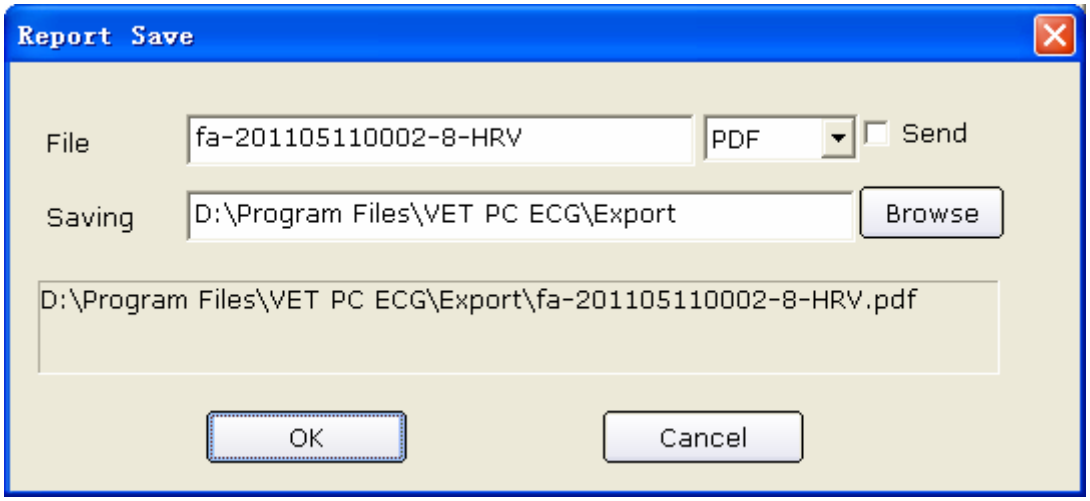
2. Click on the **Print** button on the analysis interface to print an ECG report.
3. Or click on the **Print** button on the preview interface to print an ECG report.

6.5.4 Saving ECG Reports

You can click on the **Report Save** button 

to save ECG reports.

The report format includes **PDF**, **WORD**, **JPG** and **BMP**. Click on the **Browse** button to choose the save path and click on **OK** to save the sampled data to the designated directory. During the saving course, the system will give the hint information.



If you select **Send**, the sampled data will be sent by email (outlook express) when it is saved to the designated directory. During the saving and sending course, the system will give the hint information.

Note: In Windows 7/Vista, only if OUTLOOK EXPRESS is installed, can the report be sent by email.

6.6 Sampling STAT ECG

Click on the **STAT ECG** button on the Initial Interface (Figure 6-1) to sample normal ECG directly without entering new pet information or selecting an existing pet record from the database before sampling. The system will automatically distribute a new pet ID.

Note: The operation of STAT ECG is similar to that of Resting ECG except that you do not need to enter new pet information for STAT ECG.

Chapter 7 Processing Pet Records

Click on the **Data Manager** button on the Initial Interface (Figure 6-1) to open the **Data Manager** interface (Figure 7-1).

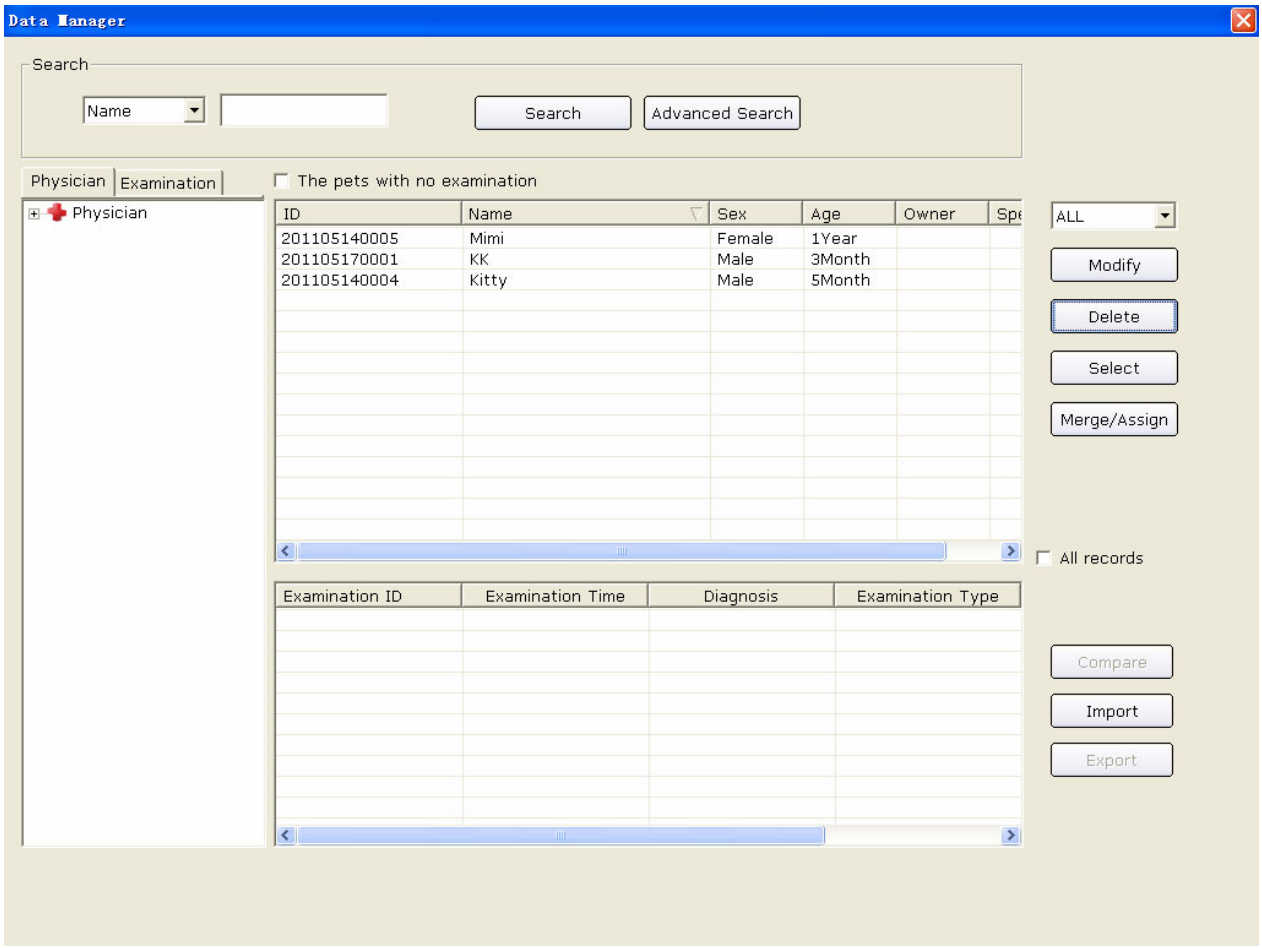
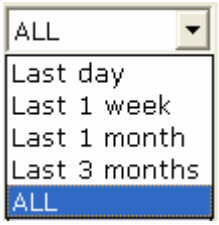


Figure 7-1 Data Manager Interface

Click on a pet record in the pet information list, and then all the examination records of the pet will be displayed in the examination record list.

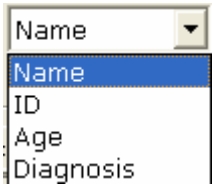
7.1 Searching Pet Records

1. Select a search item in the pull-down list on the **Data Manager** interface. Then all the pet records which meet the search condition are listed in the pet information list.



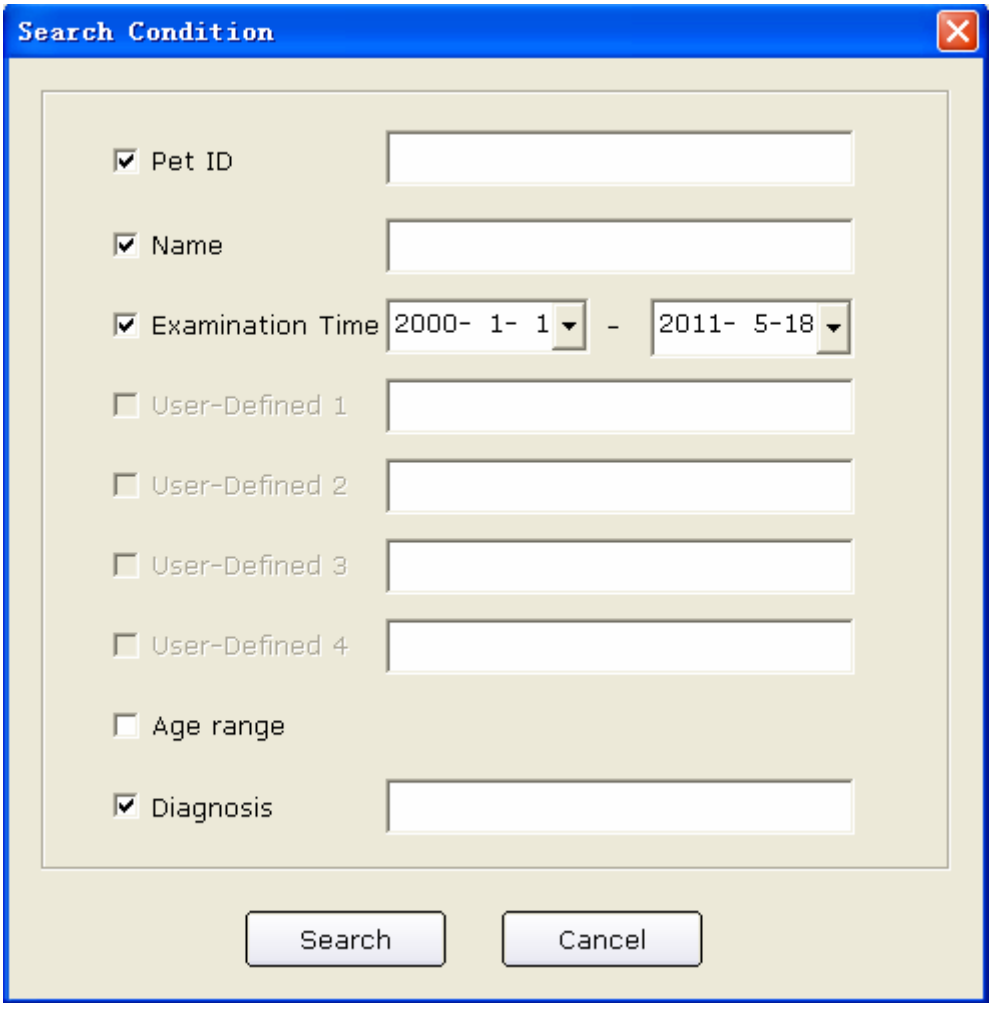
Note: Click on an item in the pet information list, such as ID, name, etc, and then all the pet records will be arranged in sequence.

2. Or select a search item in the pull-down list, enter the corresponding information in the right textbox, and then click on the **Search** button. All the pet records which meet the conditions will be displayed in the pet information list.

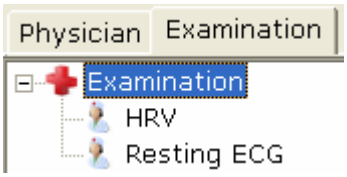


3. Or click on **Advanced Search** to display the **Search Condition** window. Then enter the search conditions. Click on the **Search** button, and all the pet records which meet the conditions will be displayed in the pet information list..

Note: User-defined 1/2/3/4 are unavailable before they are set on the Basic Information interface (Figure 8-1).



4. Or you can click on **Physician** or **Examination Record**, and choose the physician name or examination types, all the pet records which meet the conditions will be displayed in the pet information list.

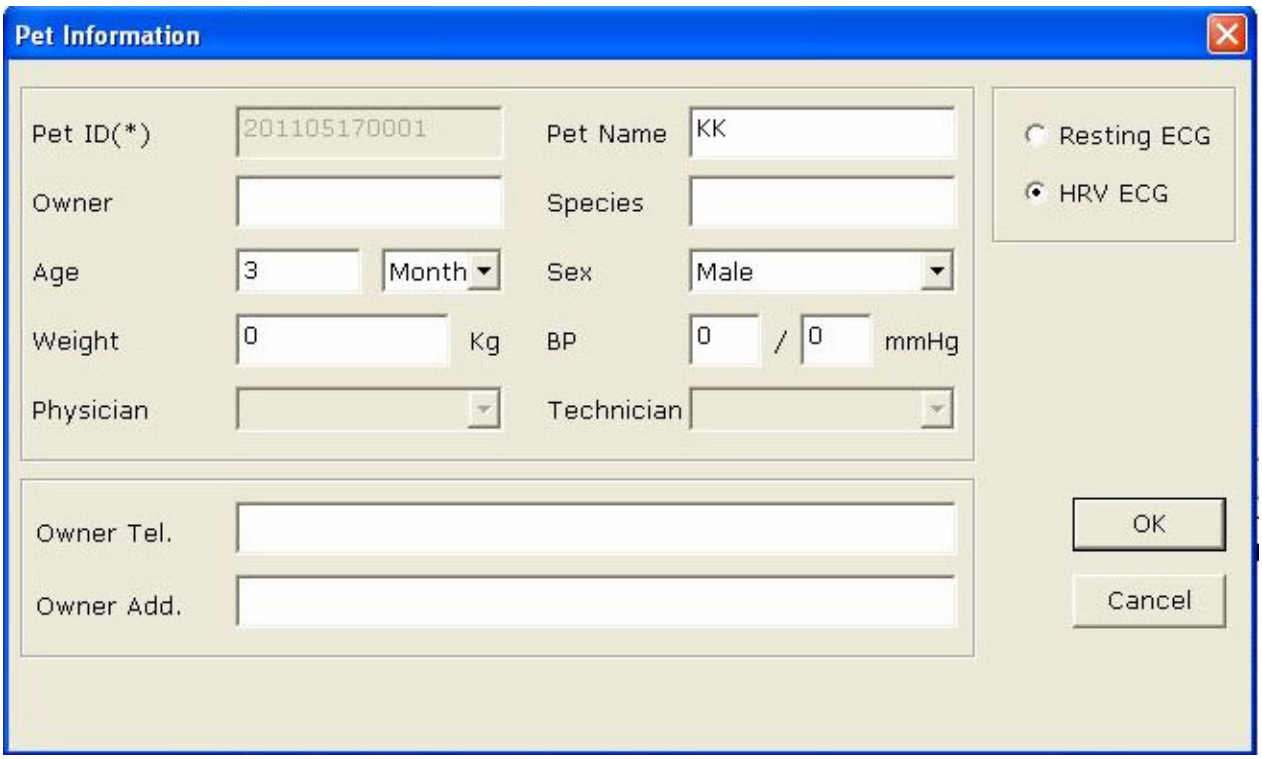


5. Select **The pet with no examination**, all pets that registered but didn't take any examination will be displayed in the pet information list.

6. Select All records, all examined pet records will be displayed in the pet record list. Otherwise, only the records of selected pet will be displayed.

7.2 Modifying Pet Records

Click on a pet record in the pet information list on the **Data Manager** interface, and then click on the **Modify** button to display the **Pet information** interface. Then you can modify the information of the pet on the **Pet information** interface. Click on the **OK** button to save these modifications.



7.3 Deleting Records

Note: The deletion of records is permanent, and you can't restore the records deleted. Please use this operation cautiously.

7.3.1 Deleting Pet Records

Click on a pet record in the pet information list on the **Data Manager** interface, and then click on the **Delete** button to delete the pet record from the pet information list. At the same time, all the examination records of the pet will be deleted.

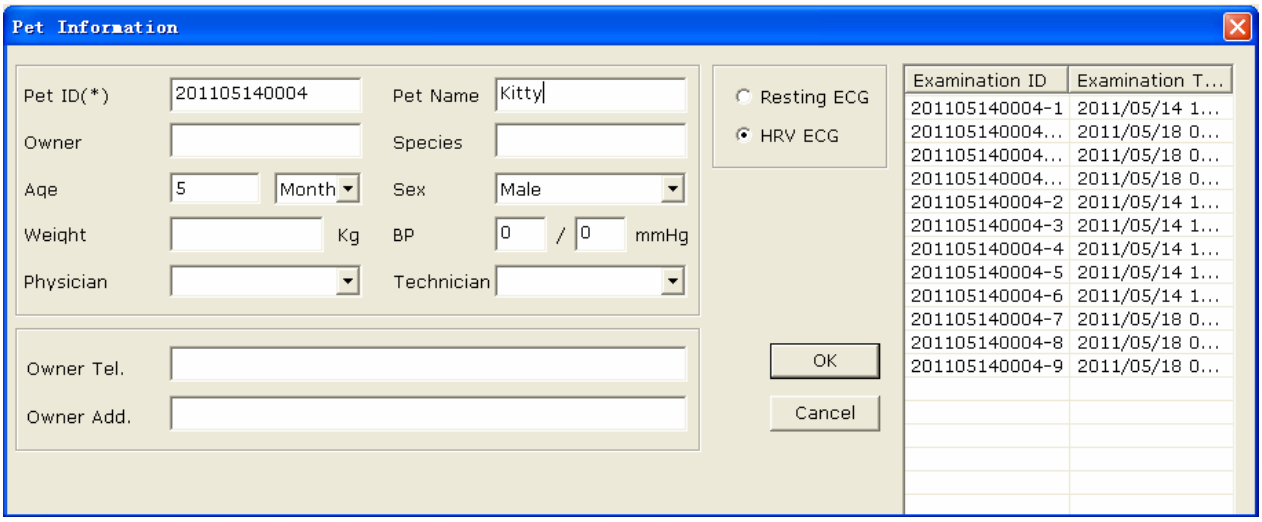
To select multiple pet records simultaneously, you can click on the first pet record to be deleted in the pet information list and press the **Shift** button on the keyboard, and then click on the last pet record to be deleted in the pet information list. You can also press the **Ctrl** button on the keyboard and then select the pet records one by one. After selecting all the pet records to be deleted, click on the **Delete** button to delete all the pet records selected from the pet information list.

7.3.2 Deleting Examination Records of a Pet

The operation methods of deleting examination records are similar to those of deleting pet records.

7.4 Selecting a Pet Record

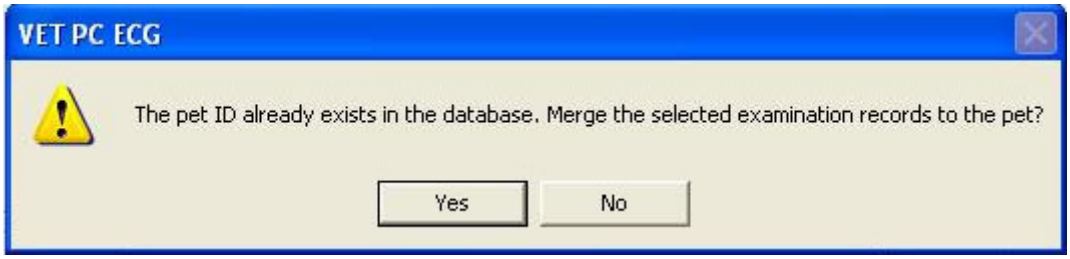
Click on a pet record in the pet information list on the **Data Manager** Interface and click on the **Select** button to display the **Pet information** Interface. Then click on the **OK** button, the system will sample ECG data of the pet.



7.5 Merging Examination Records

Select one or multiple pet records in the pet information list on the **Data Manager** interface, and click on the **Merge/Assign** button to assign the selected records. Input the pet ID and click on the **OK** button to designate the pet information of the selected records to the .pet.

If the pet ID you entered already exists in the pet information list, the following hint pops up:



Select one or multiple examination records in the examination list on the **Data Manager** interface, and click on the **Merge/Assign** button to assign the selected examination records. Input the pet ID and click on the **OK** button to designate the selected examination records to the pet.

If no pet records or examination records are selected before you click on the **Merge/Assign** button, the following hint pops up.

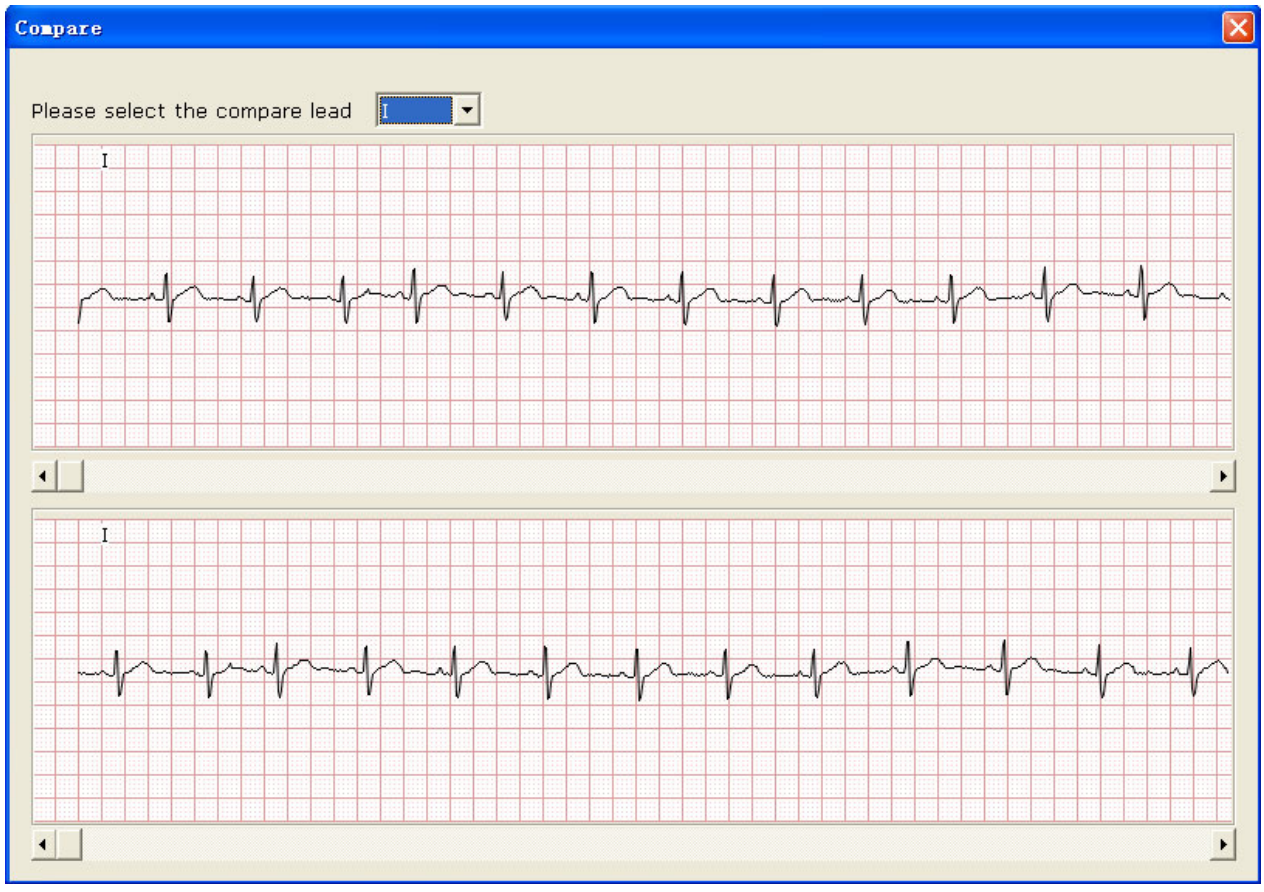
7.6 Comparing Two Examination Records

Press the **Ctrl** button on the keyboard and select two examination records, and then click on the **Compare** button to display the **Compare** interface.

Note: Please select two records to compare only in Resting ECG.

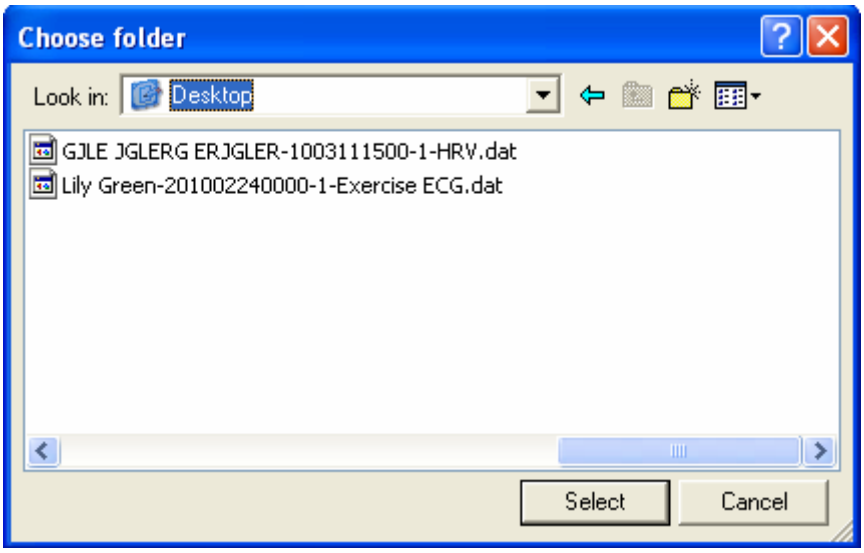
You can select the lead of six leads or seven leads from the lead pull-down list. Then the waves of the selected lead the two examination records will be displayed on the interface. You can drag the scroll bar on the bottom to view all the waves of the selected lead.

Note: 6 leads or 7 leads can be set on the **Basic Information** setup interface (Figure 8-1).



7.7 Importing ECG Data into the Data Manager Interface

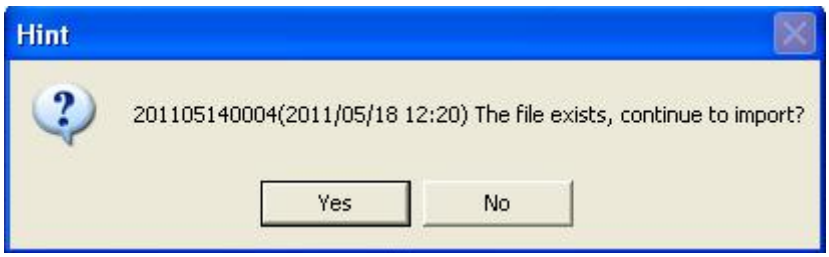
Click on the **Import** button on the **Data Manager** interface (Figure 7-1) to open the following window.



Select the record or the folder to be imported and click on the **Select** button to import the record or the folder into the **Data Manager** interface.

To import multiple examination records simultaneously, you can click on the first examination record to be imported and press the **Shift** button on the keyboard, and then click on the last examination record to be imported. You can also press the **Ctrl** button on the keyboard and then select the examination records one by one. After selecting all the examination records to be imported, click on the **Select** button to import all the examination records into the **Data Manager** interface. If all the data are successfully imported into the interface, the following hint will pop up.

If the record to be imported exists on the **Data Manager** interface, the following hint will pop up.



If you press the **Yes** button, the imported record will replace the file with a same name; If you press the **No** button, the system will cancel the operation.

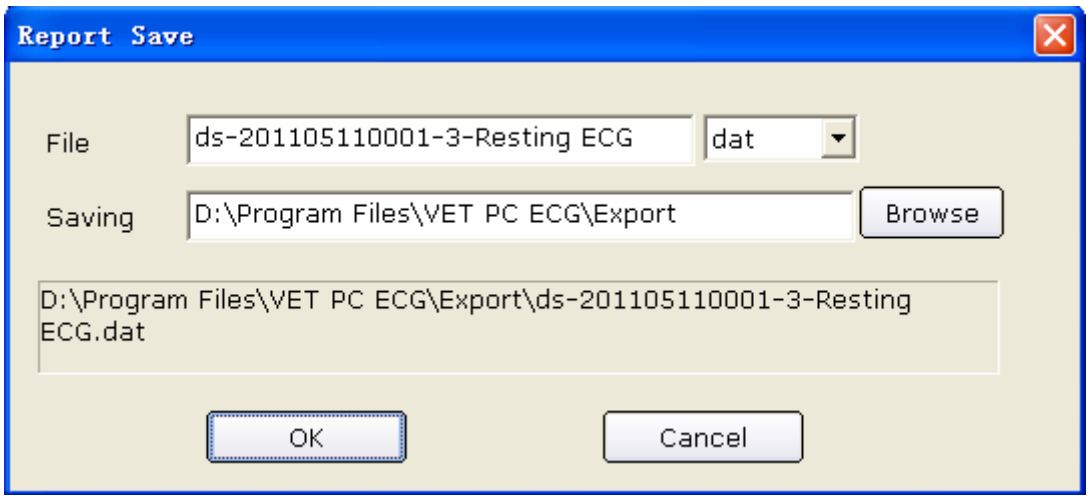
When the import is successful, the following hint will pop up.

If the imported folder includes no valid data, the following hint will pop up.

Note: Only ECG data in DAT format created by VET PC ECG software can be imported.

7.8 Exporting ECG Data from the Data Manager Interface

Select one record and click on the **Export** button on the **Data Manager** interface (Figure 7-1) to open the following interface. Designate the file name, choose the saving path, and then click on the **OK** button to export the records into the selected path. At the same time, the pet information of these records will be exported.



When the export is successful, the following hint will pop up.

7.9 Viewing an Examination Record

Click on a pet record in the pet information list, and then all the records of the pet will be displayed in the examination record list.

Select **All records** and all the examination records will be displayed in the examination record list.

Double-click on an examination record in the examination record list on the **Data Manager** interface (Figure 7-1). If it is a normal ECG record, the normal ECG analysis interface will pop up. If it is an HRV record, the HRV analysis interface will pop up. Then you can do the corresponding operation to the examination record. For more information about the operation, please refer to Section 6.5.

Chapter 8 Configuring the System

Click on the **System Setting** button on the Initial Interface (Figure 6-1) to open the **System Setting** interface.

There are four tabs on the **System Setting** interface: **Basic Information**, **Sample Setting**, **Device**, **Print Setting** and **Others**.

After you modify some information on the **System Setting** interface:

1. Click on the **OK** button to save these modifications and exit;
2. Or click on the **Cancel** button to cancel these modifications and exit.

8.1 Setting Basic Information

Click on the **Basic Information** tab on the **System Setting** interface to display the basic information setup interface.

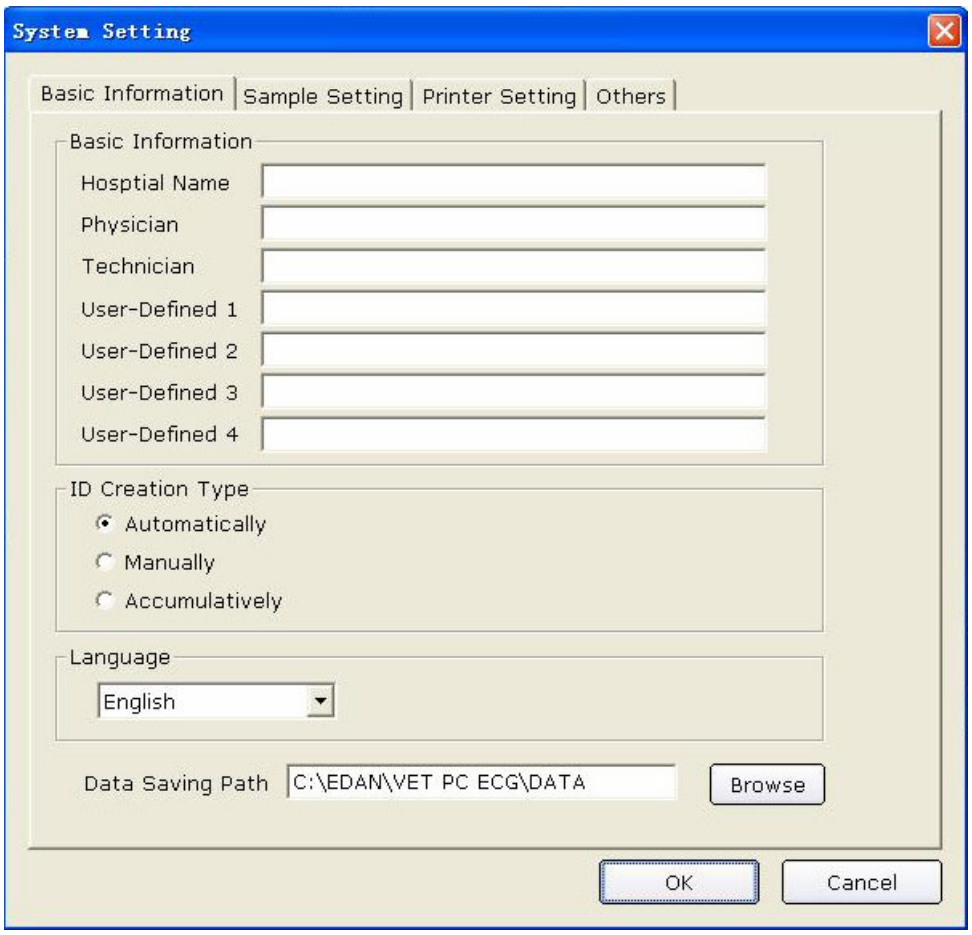


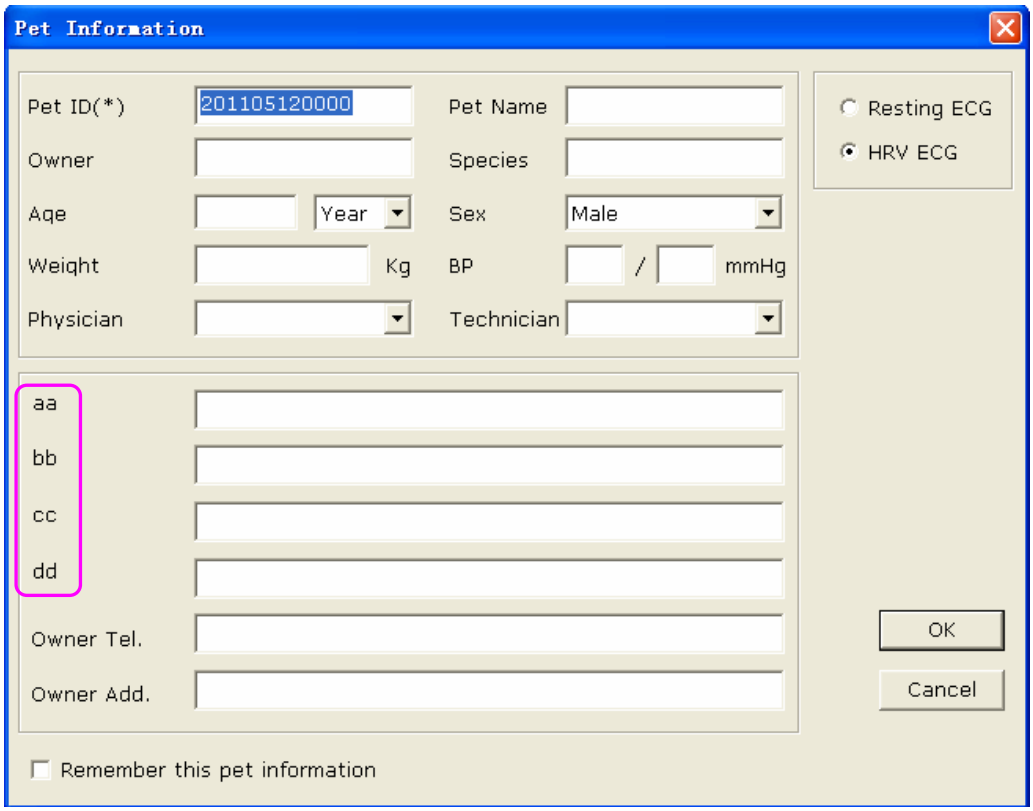
Figure 8-1 Basic Information Setup Interface

8.1.1 Setting Basic Information

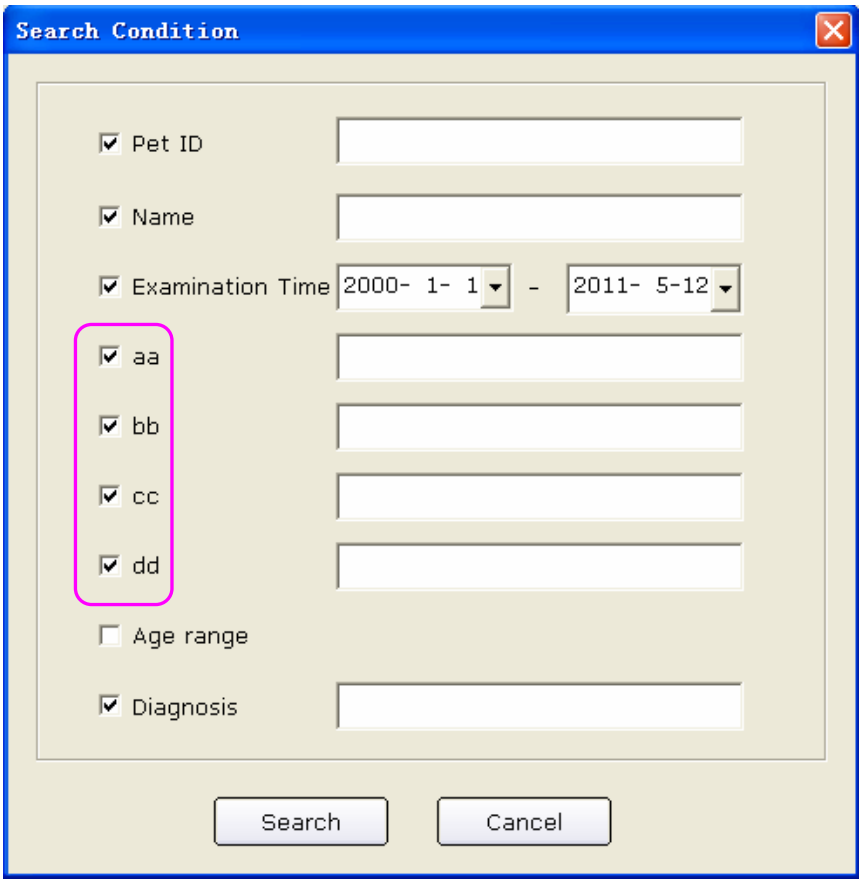
Enter information in the **Hospital Name**, **Physician Name**, **Technician Name**, or **User-Defined 1/2/3/4** textbox on the **Basic Information** setup interface (Figure 8-1).

When you fill in the **User-Defined 1/2/3/4** textbox, the corresponding items on the **Pet information** interface will change into what is filled.

For example, when you enter **aa** in the **User-Defined 1** textbox, enter **bb** in the **User-Defined 2** textbox, enter **cc** in the **User-Defined 3** textbox, and enter **dd** in the **User-Defined 4** textbox on the basic information setup interface (Figure 8-1), the corresponding items on the **Pet information** interface and the **Search Condition** interface will be **aa**, **bb, cc, and dd** respectively.



(a)



(b)

Note: Click on the **New Pet** button on the Initial Interface to open the **Pet information** interface as the figure (a) shows. Click on the **Data Manager** button on the Initial Interface, and then click on the **Advanced Search** button to open the **Data Manager** interface as the figure (b) shows

8.1.2 Setting ID Mode

Set **ID Creation Type** to **Automatically, Manually** or **Accumulatively.**

When **ID Creation Type** is set to **Automatically**, the pet ID can be automatically generated according to the examination date.

When **ID Creation Type** is set to **Manually**, you should enter the pet ID manually on the **Pet information** interface.

When **ID Creation Type** is set to **Accumulatively**, the pet ID can be increased by one automatically. You need to set the prefix (not necessary) and the starting number for ID. The prefix textbox can input 10 letters or 10 numbers, and the ID textbox can input 10 numbers, at least one number.

8.1.3 Setting Language

You can set the language to **Chinese** or **English**.

Note: To validate the language setup, after setting, you should exit the system and open it again.

8.1.4 Specifying the Storage Path of the ECG Data

Click on the **Browse** button on the basic information setup interface (Figure 8-1) to assign the storage path.

8.2 Setting Sample

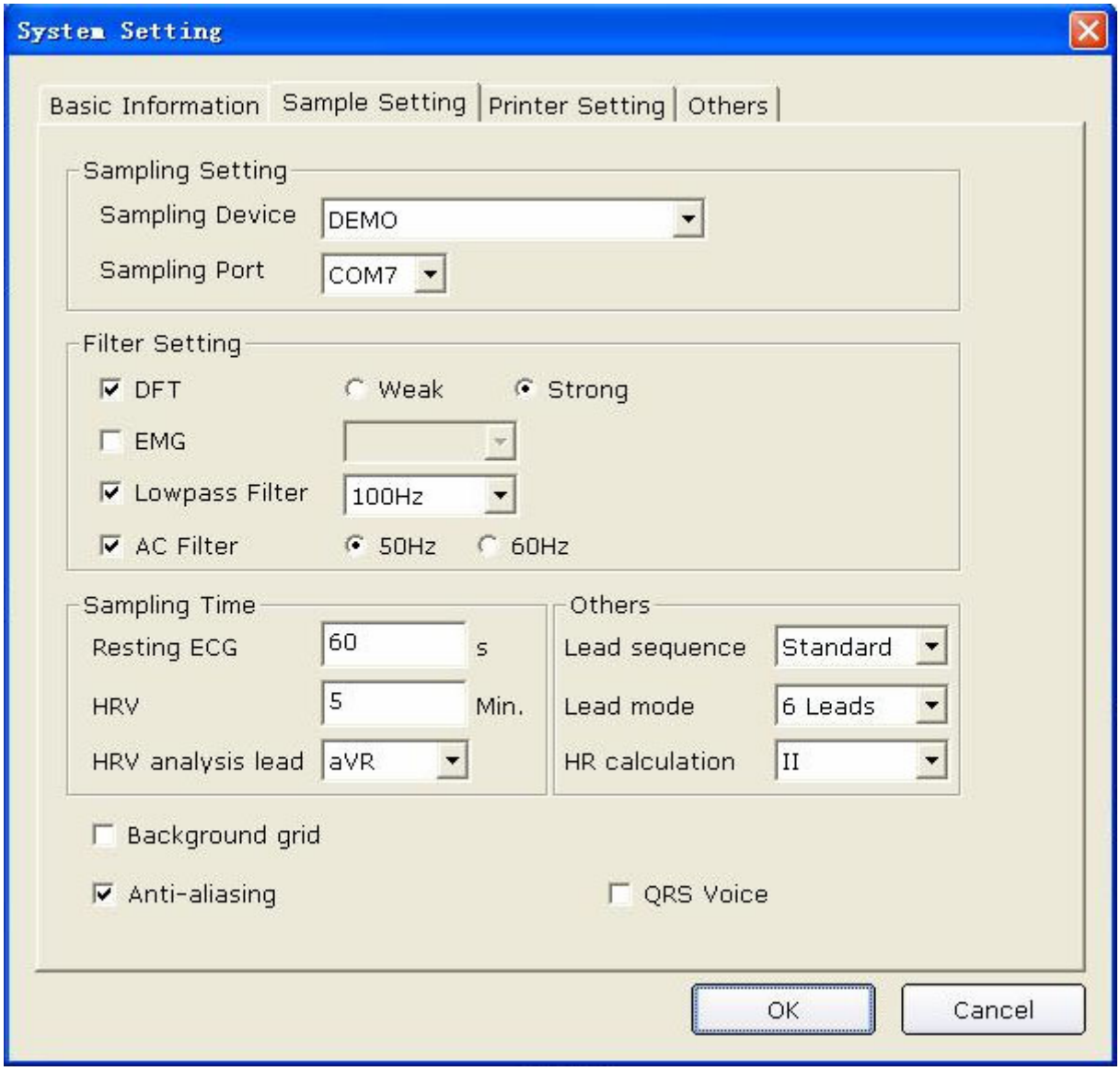


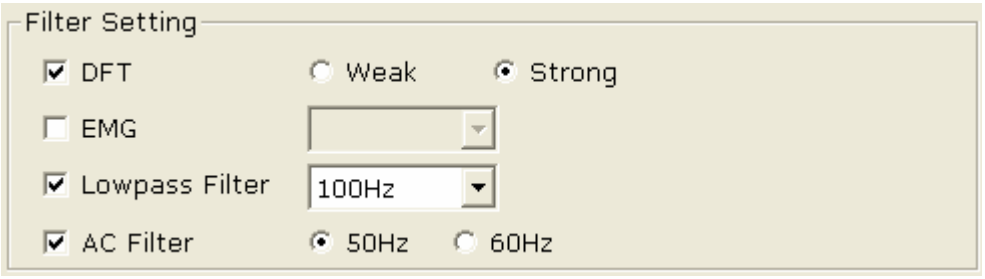
Figure 8-2 Sample Setup Interface

8.2.1 Setting Sample

Select a sampling device from the **Sampling Device** pull-down list on the **Sample Setting** interface (Figure 8-2).

Sampling Port can be set to a value from COM0 to COM9.

8.2.2 Setting Filter



Set filters on the sample setup interface (Figure 8-2).

DFT Filter

DFT filter greatly reduces the baseline fluctuations without affecting ECG signals. There are two options: **Weak** and **Strong**.

Note: If DFT filter is set to **Strong**, the ECG data displayed on the screen is 0.85 seconds later than the real-time ECG data; if DFT filter is set to **Weak**, the ECG data displayed on the screen is 1.8 seconds later than the real-time ECG data.

EMG Filter

EMG filter suppresses the disturbance caused by strong muscle tremor. The cutoff frequency can be set to **25Hz**, **35Hz**, or **45Hz**.

Lowpass Filter

Lowpass filter restricts the bandwidth of input signals. The cutoff frequency can be set to **75Hz**, **100Hz** or **150Hz**. All the input signals whose frequency is higher than the setting cutoff frequency will be attenuated.

AC Filter

AC filter suppresses AC interference without attenuating or distorting ECG signals. There are two options: **50Hz** and **60Hz**.

8.2.3 Setting Sampling Time

You can enter the normal ECG sampling time manually. The range is 10~600s.
You can enter the HRV sampling time manually. The range is 1~15min.
You can set the HRV analysis lead to one of the 6 leads (I, II, III, aVR, aVL, aVF) or 7 leads (I, II, III, aVR, aVL, aVF, V).

8.2.4 Setting Lead Sequence

You can set **Lead Sequence** to **Standard** or **Cabrera**, and the lead groups are displayed or printed in the corresponding sequence listed in the following table.

Lead Sequence	**Lead group 1**	**Lead group 2**	**Lead group 3**
Standard	I, II, III	aVR, aVL, aVF	V
Cabrera	aVL, I, -aVR	II, aVF, III	V

If the Lead Sequence is changed, click on **OK** button to save the change, and enter the System Setting interface again, the rhythm lead sequence of print format on the Printer Setting interface will change correspondingly.

You can set **Lead Mode** to **6 Leads or 7 Leads.**

You can set the **HR calculation** to one of the 6 standard leads: I, II, III, aVR, aVL, aVF or one of the 7 standard leads: I, II, III, aVR, aVL, aVF, V.

8.2.5 Setting Background Grid

Select **Background Grid,** the grid on the background of the ECG sampling interface and Normal Analysis interface will be displayed.
Deselect **Background Grid**, the grid on the background of the ECG sampling interface will not be displayed.

8.2.6 Setting Anti-aliasing

Select **Anti-aliasing,** the system will automatically make the waveform smooth.

Deselect **Anti-aliasing,** the system will not make the waveform smooth.

8.2.7 Selecting QRS Voice

If you select **QRS Voice**, there will be a beep when an R wave is detected in succession.

8.3 Setting Printer

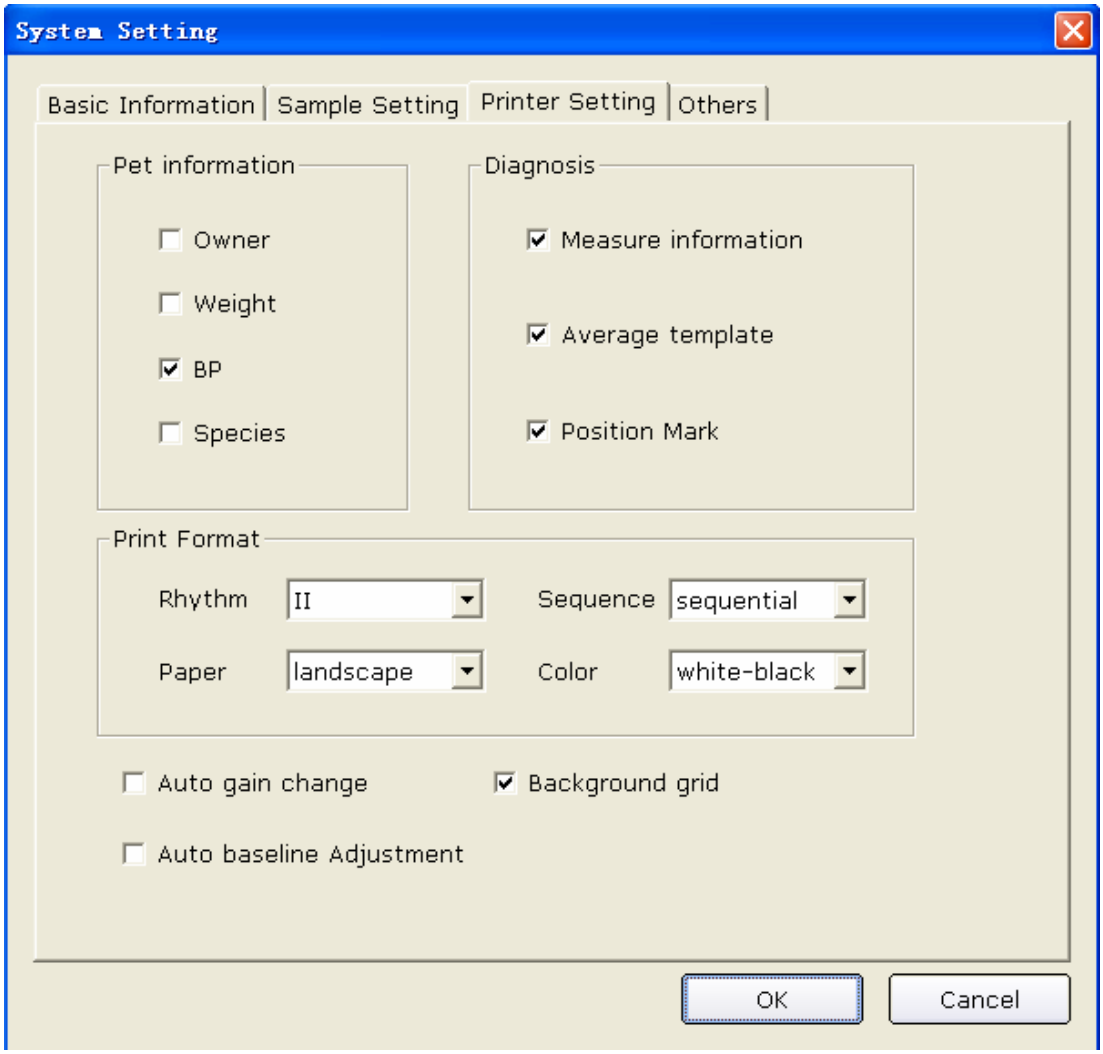


Figure 8-3 Printer Setting Interface

8.3.1 Choosing Pet Information to be Printed

The default item of the pet information is Owner. You can also select the additional information, such as weight, BP and species. The pet information items you select will be displayed in the report printed out.

8.3.2 Choosing Diagnosis Information to be Printed

The diagnosis information is displayed on the preview interface and in the report printed out.

Position Mark should be selected together with **Average template**, because the position mark is only used to mark the position of ECG waves in the average template. Select **Auto Measure** to display values of parameters.

8.3.3 Setting Rhythm Lead

The rhythm lead can be one of 6 standard leads or 7 standard leads.

When the printing mode is set to **3×2+1** or **3×3+1**, the rhythm lead selected in the **Rhythm** list box will be printed out.

8.3.4 Defining Printing Format

1. Set **Sequence** to **sequential** or **synchronous**.

When **Sequence** is set to **sequential**, the lead group is printed one by one in a certain sequence. The start time of a lead group is just the end time of the previous lead group.

When **Sequence** is set to **synchronous**, all leads are printed simultaneously. The start time of each group is the same.

2. Set **Paper** to **landscape** or **portrait**.
3. Set **Color** to **white-black** or **color.**

Note: If the printing color is set to color, but a black-and-white printer is used, the report printed will be illegible.

4. Select **Auto gain change** and the gain will be changed automatically.
5. Select **Background grid** and the background grid will be printed in the report.
   Deselect **Background grid** and the background grid won't be printed in the report.
6. Select **Auto Baseline Change**, the baseline will be adjusted automatically.

8.4 Setting Others

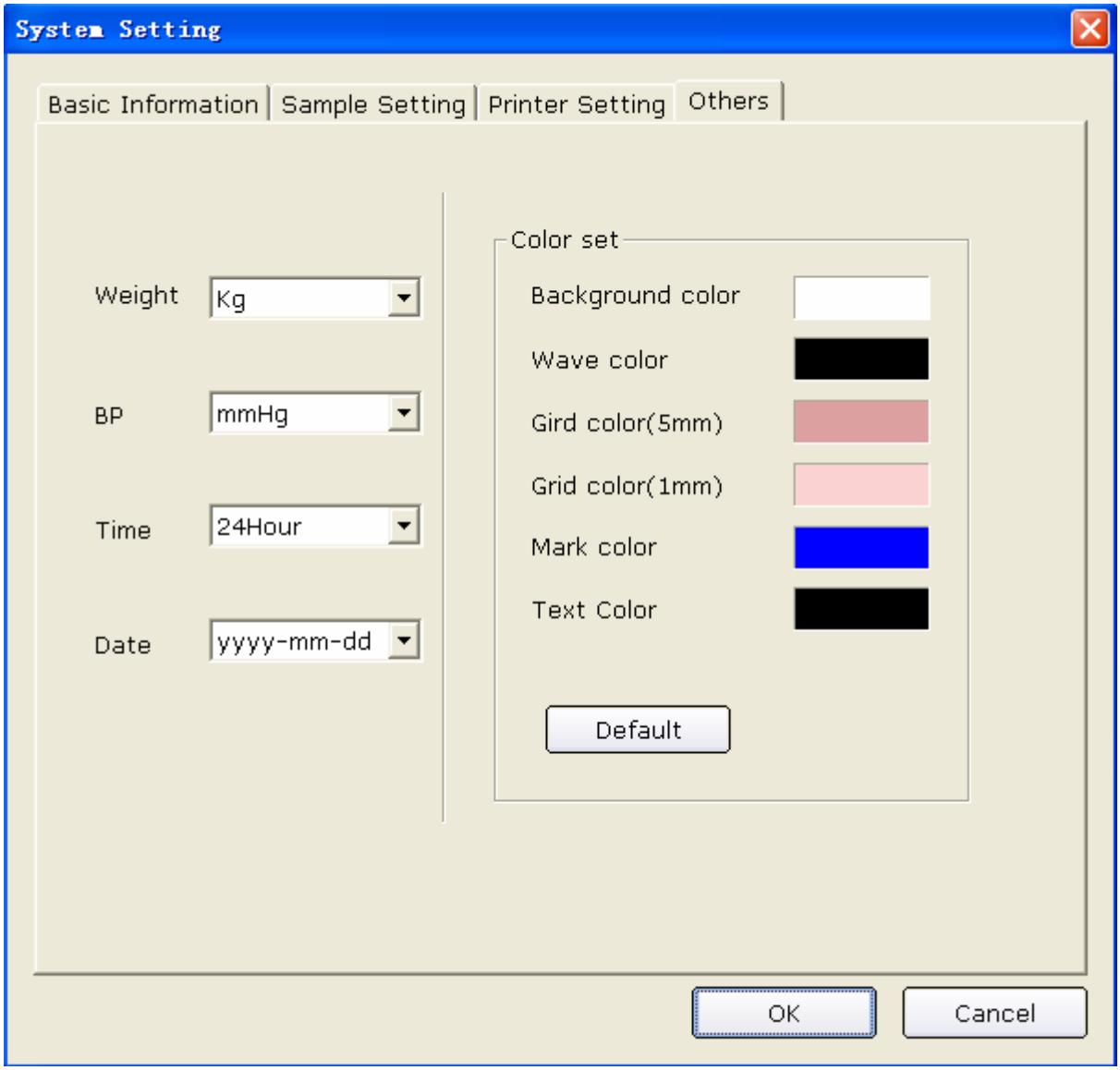


Figure 8-4 Other Setup Interface

8.4.1 Setting Unit

Set the weight unit to **Kg** or **Pound**.

Set the BP unit to **kPa** or **mmHg**.

Set the time mode to **24Hour** or **12Hour**.

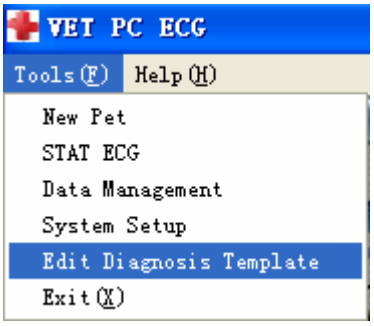
Set the date mode to **mm-dd-yyyy, dd-mm-yyyy or yyyy-mm-dd.**

8.4.2 Setting Color

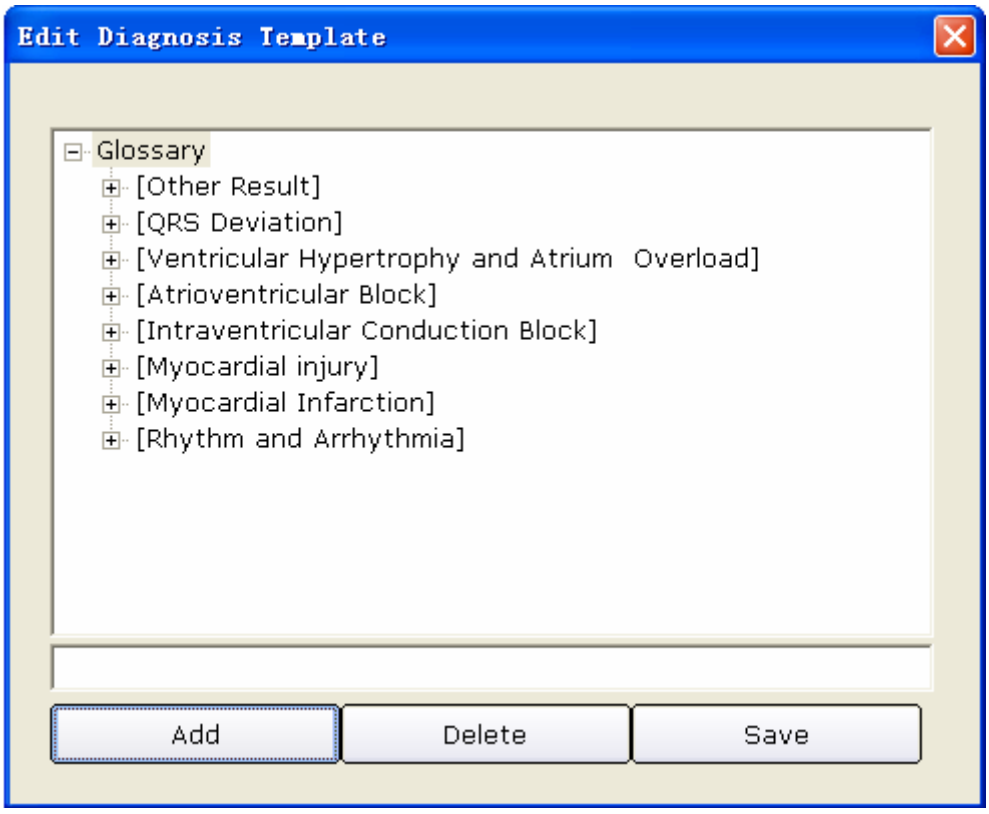
Set the color of the background, waves, grid (5mm), grid (1mm), mark and text. If you want to change a color, double-click on the color block to display the **Color** interface, and then you can select your favorite color.

Click on the **Default** button to restore the default colors.

8.5 Modifying the Glossary

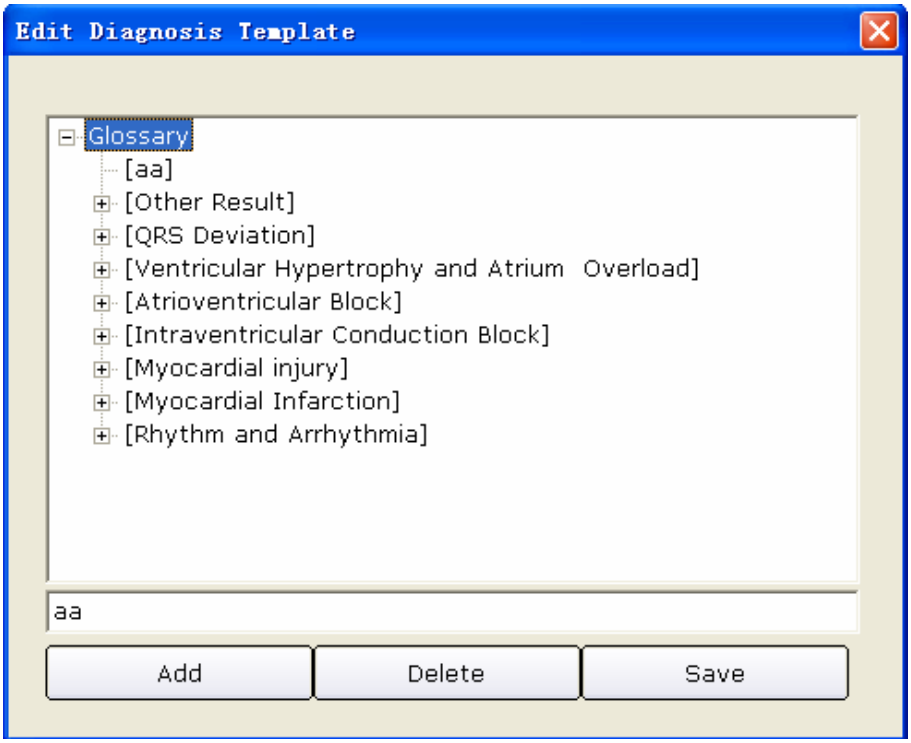


Click on **Edit Diagnosis Template** in the **Tool (F)** pull-down list on the Initial Interface (Figure 6-1), and then the **Edit Diagnosis Template** window appears.



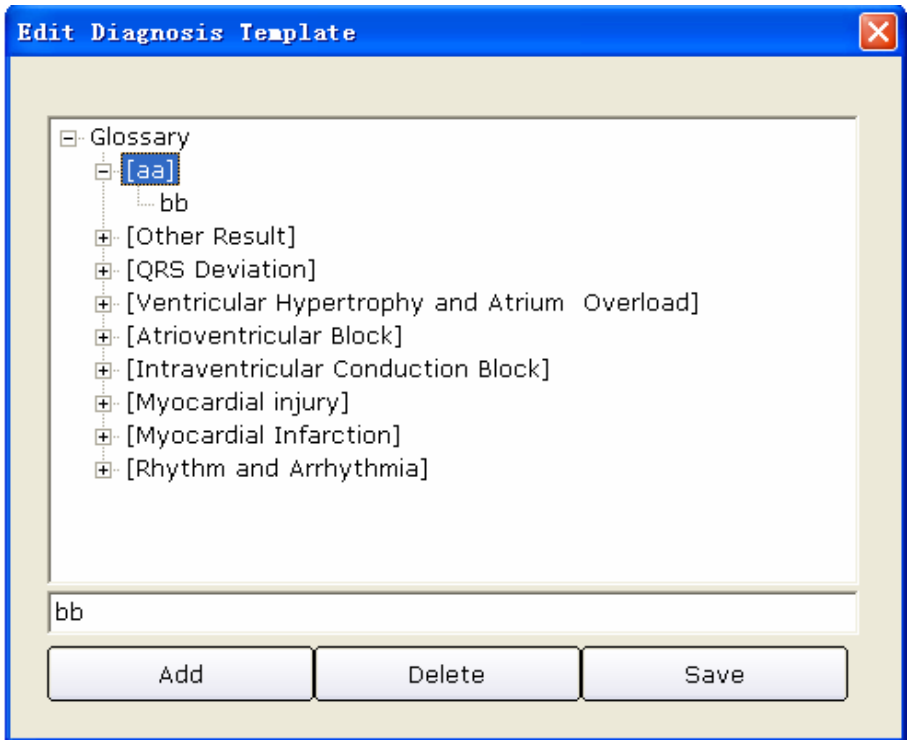
1. Adding an item

Enter a diagnosis item in the textbox, such as **aa,** and then click on the **Add** button. The added item will be displayed on the **Edit Diagnosis Template** interface.



2. Adding a sub-item

Click on the item you wanted to add a sub-item, enter a diagnosis sub-item, such as bb in the textbox, and then click on the Add button. The added sub-item will be displayed under aa.



3. Deleting an item

Click on the item you wanted to delete on the **Edit Diagnosis Template** interface, and then click on the Delete button to delete this item.

4. Save the settings

Click on the **Save** button to save these modifications.

Chapter 9 Hint Information

Hint information and the corresponding causes provided by the system are listed as follows.

Table 9-1 Hint Information and Causes

Hint Information	**Causes**
Lead off: X	Electrodes fall off the pet or the patient cable falls off the ECG sampling box.
It is pre-sampling now, please click on “Start” to begin recording.	During the pre-sampling course
Resting ECG is sampling now!	During the sampling course of Resting ECG
Can't detect the Sentinel, enter DEMO?	The sentinel is not connected.
Sentinel is not compatible, enter DEMO?	The sentinel is set wrongly.
Hint: Please make sure the USB cable has been connected. If possible, please re-connect it!	The USB cable is disconnected or the communication between the ECG sampling box and the serial port is interrupted. 1. Reconnect the ECG sampling box to the PC. 2. Click on the **Device** tab on the **System Setting** interface of the VET PC ECG system, and check whether the sampling device is set correctly.
Communication error! Please check the USB cable!	The USB cable falls off the PC during the sampling process.
Overload	The direct current offset voltage on an electrode is too high.
Sorry, Can not Connect to the Database!	MSDE 2000 or SQL Server 2005 Express is not started up.
Fail to create database!	The system fails to create database.

Chapter 10 Accessories

WARNING

Only the patient cable and other accessories supplied by the manufacturer can be used. Or else, the performance and electric shock protection can not be guaranteed.

Table 10-1 Standard Accessory List

Part Number	Accessory
01.13.036134	Resting ECG External USB Cable
11.56.078136	Portable Bag
02.01.210081	DP12 ECG Sampling Box
01.18.047311	Sentinel / USB
01.03109827	VET ECG 5-electrode Lead Wire
11.57.471041-10	Veterinary Electrode
11.25.78047	Electrode Gel

Chapter 11 Cleaning and Maintenance

CAUTION

Turn off the system power and drag the power cable out from the socket before cleaning or disinfection.

11.1 Cleaning and Maintaining the Patient Cable and Reusable Electrodes

WARNING

Failure on the part of the responsible individual hospital or institution employing this equipment to implement a satisfactory maintenance schedule may cause undue equipment failures and possible health hazards.

- Clean the patient cable with a clean soft cloth. Do not use the detergent containing alcohol to clean the patient cable.
- Integrity of the patient cable, including the main cable and lead wires, should be checked regularly. Make sure that it is conductible.
- Do not drag or twist the patient cable with excessive stress while using it. Hold the connector plugs instead of the cable when connecting or disconnecting the patient cable.
- Align the patient cable to avoid twisting, knotting or crooking at a closed angle while using it.
- Store the lead wires in a big wheel.
- Once damage or aging of the patient cable is found, replace it with a new one immediately.

Remove the remainder gel from the electrodes with a clean soft cloth first. Take suction bulbs and metal cups of chest electrodes apart, and take clamps and metal parts of limb electrodes apart. Clean them in warm water and make sure that there is no remainder gel. Dry the electrodes with a clean dry cloth or air dry naturally.

CAUTION

1. The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal.
2. The disposable electrodes can only be used for one time.

11.2 Disinfection

To avoid permanent damage to the equipment, disinfection can be performed only when it is considered as necessary according to your hospital's regulations.

Before disinfection, clean the equipment first. Then wipe the surfaces of the unit and the patient cable with hospital standard disinfectant.

CAUTION

Do not use chloric disinfectant such as chloride, sodium hypochlorite etc.

Chapter 12 Warranty and Service

12.1 Warranty

EDAN warrants that EDAN's products meet the labeled specifications of the products and will be free from defects in materials and workmanship that occur within warranty period.

The warranty is void in cases of:

a) Damage caused by mishandling during shipping.

b) Subsequent damage caused by improper use or maintenance.

c) Damage caused by alteration or repair by anyone not authorized by EDAN.

d) Damage caused by accidents.

e) Replacement or removal of serial number label and manufacture label.

If a product covered by this warranty is determined to be defective because of defective materials, components, or workmanship, and the warranty claim is made within the warranty period, EDAN will, at its discretion, repair or replace the defective part(s) free of charge. EDAN will not provide a substitute product for use when the defective product is being repaired.

12.2 Contact information

If you have any question about maintenance, technical specifications or malfunctions of devices, contact your local distributor.

Alternatively, you can send an email to EDAN service department at: support@edan.com.cn.

Chapter 13 Recommended Optional Accessories

Electrical Outlet:

Power Consumption: no less than 4500VA
Special use for medical equipment

Printer:

Model: HP2035, HP5568
Manufacturer: HP Company, USA

Model: CANON3500, CANON1800
Manufacturer: CANON Company, Japan

WARNING

1. The electrical outlet and the isolating transformer shall only be used for supplying power to the part of the system.
2. It will harm the wall outlet to connect the non-medical electrical equipment of the VET PC ECG system directly to the wall outlet, because the non-medical electrical equipment of the system is intended to be powered by using the electrical outlet and the isolating transformer.
3. An additional multiple portable socket-outlet or extension cord shall not be connected to the system.
4. The electrical outlet and the isolating transformer shall not be placed on the floor.

Appendix 1 Technical Specifications

A1.1 Safety Specifications

Comply with:		IEC 60601-1: 1988+A1+A2, EN 60601-1:1990+A1+A2, IEC/EN60601-1-2: 2001+A1, IEC/EN60601-2-25, ANSI/AAMI EC11, IEC/EN60601-2-51
Anti-electric-shock type:		Class II
Anti-electric-shock degree:		Type CF with defibrillation-proof
Degree of protection against harmful ingress of water:		Ordinary equipment (Sealed equipment without liquid proof)
Disinfection/sterilization method:		Refer to the user manual for details
Degree of safety of application in the presence of flammable gas:		Equipment not suitable for use in the presence of flammable gas
Working mode:		Continuous operation
EMC:		Group I, Class A
Patient Leakage Current:	NC	<10μA (AC) / <10μA (DC)
	SFC	<50μA (AC) / <50μA (DC)
Patient Auxiliary Current:	NC	<10μA (AC) / <10μA (DC)
	SFC	<50μA (AC) / <50μA (DC)

A1.2 Environment Specifications

	Transport & Storage	Working
Temperature:	DP12 ECG sampling box: -40ºC (-40ºF) ~ +55ºC (+131ºF)	+5ºC (+41ºF) ~ +40ºC (+104ºF)
Relative Humidity:	25%~93% Non-Condensing	25%~80% Non-Condensing
Atmospheric Pressure:	700hPa ~1060hPa	860hPa ~1060hPa

A1.3 Physical Specifications

Dimensions	DP12 ECG sampling box: 148 mm (L) ×100 mm (W) × 40 mm (H) (5.8in×3.9in×1.6in)
Weight	DP12 ECG sampling box: Approx. 210g

A1.4 Power Supply Specifications

Power Supply:	PC	Operating Voltage: 110V-240V~
		Operating Frequency: 50 Hz/60 Hz
	DP12 ECG Sampling Box	DC 5V
		Input Power: 1 VA(MAX), 0.5 VA(MIN)

A1.5 Performance Specifications

Display	
Display Content	System name, Pet ID, Pet name Hear rate, Display mode, Printing mode Speed, Gain, Lowpass Filter Hint information ECG waves
Recording	
Recording Paper:	A4, B5, Letter
Paper Width:	A4(210 × 297mm), B5(182 × 257mm), Letter(216 × 279mm),
Paper Speed:	5 mm/s, 6.25 mm/s, 10 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s（±3%）
Record message:	Date, Time, Printing Speed, Filter, Symbol, Heart Rate, Pet ID, Sex, Age, Lead Mark, Lead Wave, Average Template Wave or Rhythm Lead Wave, Measurement Result and Interpretation Information Result (option) etc.
Channel:	6 / 7 channels, auto baseline adjustment
HR Recognition	
Technique:	Peak-peak detection
HR Range:	30 BPM ~300 BPM

Accuracy:	±1 BPM
Memory	
Memory:	Storage amount depends on PC machine
ECG Sampling Box Performance	
Leads Mode:	6/7 leads
Acquisition Mode:	simultaneously 6/7 leads
Sample Frequency:	DP12 ECG sampling box: 1,000 /sec/channel
A/D Resolution:	DP12 ECG sampling box: 24 bits
Time Constant:	≥3.2 s(0, +20%)
Frequency Response:	0.05 Hz ~ 150 Hz (-3 dB)
Gain:	0.625, 1.25, 2.5, 5, 10，20, 40(mm/mV)
Input Impedance:	DP12 ECG sampling box≥50 MΩ (10Hz)
Input Circuit Current:	≤0.05 μA
Input Voltage Range	<±5 mVpp
Calibration Voltage:	1 mV± 2%
DC Offset Voltage	DP12 ECG sampling box: ±600mV
Noise:	DP12 ECG sampling box≤12.5μVp-p
Filter	Work Frequency
	DFT Filter: weak/strong
	LOWPASS Filter: 25 / 35 / 45 / 75 / 100 / 150 (Hz)
CMRR	DP12 ECG sampling box≥110 dB

Note: Test the accuracy of input signal reproduction according to the methods described in clause 4.2.7.2 in ANSI/AAMI EC11:1991/(R) 2001, and the result complies with clause 3.2.7.2 in ANSI/AAMI EC11:1991/(R) 2001.

Appendix 2 EMC Information

Guidance and manufacture's declaration - electromagnetic emissions- for all EQUIPMENT and SYSTEMS

<table>
<tr><th colspan="3">Guidance and manufacture's declaration - electromagnetic emission</th></tr>
<tr><td colspan="3">VE-1010 VET PC ECG is intended for use in the electromagnetic environment specified below. The customer or the user of VE-1010 VET PC ECG should assure that it is used in such an environment.</td></tr>
<tr><th>Emission test</th><th>Compliance</th><th>Electromagnetic environment - guidance</th></tr>
<tr><td>RF emissions
CISPR 11</td><td>Group 1</td><td>VE-1010 VET PC ECG uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td></tr>
<tr><td>RF emission
CISPR 11</td><td>Class A</td><td rowspan="3">VE-1010 VET PC ECG is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.</td></tr>
<tr><td>Harmonic emissions
IEC 61000-3-2</td><td>Not applicable</td></tr>
<tr><td>Voltage fluctuations/ flicker emissions
IEC 61000-3-3</td><td>Not applicable</td></tr>
</table>

Guidance and manufacture's declaration - electromagnetic immunity - for all EQUIPMENT and SYSTEMS

Guidance and manufacture's declaration - electromagnetic immunity			
VE-1010 VET PC ECG is intended for use in the electromagnetic environment specified below. The customer or the user of VE-1010 VET PC ECG should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	Not applicable	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line to line ±2 kV line to ground	Not applicable	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50Hz/60Hz) magnetic field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Not applicable	Mains power quality should be that of a typical commercial or hospital environment. If the user of VE-1010 VET PC ECG requires continued operation during power mains interruptions, it is recommended that VE-1010 VET PC ECG be powered from an uninterruptible power supply or a battery.
NOTE： U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacture's declaration - electromagnetic immunity - for EQUIPMENT and SYSTEMS that are not LIFE-SUPPORTING

Guidance and manufacture's declaration - electromagnetic immunity			
VE-1010 VET PC ECG is intended for use in the electromagnetic environment specified below. The customer or the user of VE-1010 VET PC ECG should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC61000-4-6	3 V_{rms} 150 kHz to 80 MHz	$3V_{rms}$	Portable and mobile RF communications equipment should be used no closer to any part of VE-1010 VET PC ECG, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = 1.2\sqrt{P}$
Radiated RF IEC61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV			

broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which VE-1010 VET PC ECG is used exceeds the applicable RF compliance level above, VE-1010 VET PC ECG should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating VE-1010 VET PC ECG.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile
RF communications equipment and the EQUIPMENT or SYSTEM - for EQUIPMENT or SYSTEM that are not LIFE-SUPPORTING

Recommended separation distances between
portable and mobile RF communications equipment and VE-1010 VET PC ECG

VE-1010 VET PC ECG is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of VE-1010 VET PC ECG can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and VE-1010 VET PC ECG as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	**Separation distance according to frequency of transmitter (m)**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	**0.12**	**0.12**	**0.23**
0.1	**0.38**	**0.38**	**0.73**
1	**1.2**	**1.2**	**2.3**
10	**3.8**	**3.8**	**7.3**
100	**12**	**12**	**23**

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Appendix 3 Abbreviation

Abbr	**English**
ECG	Electrocardiograph/Electrocardiogram
HRV	Heart Rate Variability
HR	Heart Rate
P	P-wave Duration
PR	P-R Interval
QRS	QRS Complexes Duration
QT/QTc	Q-T Interval of the Current Lead / Normalized QT Interval
P/QRS/T	Dominant Direction of the Average Integrated ECG Vectors
Maximum/Minimum	Ratio of Maximum RR Interval to Minimum RR Interval
SDNN	Standard Deviation of Normal to Normal Intervals
RMSSD	Root Mean Square Successive Difference
LF	Low Frequency
HF	High Frequency
LF (norm)	Standard LF Power
HF (norm)	Standard HF Power
aVF	Left Foot Augmented Lead
aVL	Left Arm Augmented Lead
aVR	Right Arm Augmented Lead
LA	Left Arm

R	Right
RA	Right Arm
RL	Right Leg
ID	Identification
AC	Alternating Current
USB	Universal Serial Bus

P/N: 01.54.109855-12

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